FUNGIFAMA

March 2016 - Table of Contents

SVIMS Pearson College Foray 2016

Photo Credit James Holkko

In Memoriam: Jean Johnson

On February 16, 2016, SVIMs lost a good friend and long-time member, Jean Johnson. It was Jean's wish that her life should be celebrated with a hootenanny with singing and dancing. This will be held on May 7 – details to follow. In her memory donations may be made to Ovarian Cancer Canada, 831-470 Granville Street, Vancouver BC V6C 1V5.

From the moment that Jean joined SVIMS, she contributed her many skills and talents to the betterment of the club and displayed unflagging dedication to SVIMS. Jean was instrumental in developing SVIMS into the organization it is today.

From 2000 through 2011, Jean held formal roles as President, Treasurer, Secretary, Memberships, and Subscriptions. When Jean was Secretary, she laid the foundation for job descriptions, policy and our constitution. Jean encouraged others to step up and take on formal roles with SVIMS. Whether off or on the executive, Jean stayed intimately involved and applied her strategic thinking and deep humanity when it came to difficult issues that the club has faced, always wanting to be respectful and inclusive of everyone.

Jean contributed to our newsletter, Fungifama, by writing articles and submitting photos highlighting our mushrooms shows and forays and always focusing on thanking other volunteers. She also provided interesting articles from the internet on mycological oddities and innovation: mushroom jewellery, slimy slime molds, North American Mycoflora Project, and she wrote reviews of mushroom books.

Jean helped organize the Cowichan Lake Foray, the Bamfield Foray, a microscopy class, Taylor Lockwood's presentation, and a mycological foray of China Town. She

put together the SVIMS calendar; provided refreshments at meetings and mushroom shows; and created an annual fungi display basket for the mushroom show. With her husband Steve, she kept us entertained with a video taken at a President's picnic and with mushroom-themed carved jack-o'-lanterns at a mushroom show.

Jean's artistic and creative side was ever present. For example, she instructed a workshop on Paper Creations from Mushrooms and organized an Art Show and Sale at a mushroom show. She inspired the writing of the SVIMS Anniversary Song, celebrating the 20th anniversary of SVIMS, and led a group in singing this song at the banquet and a following meeting. Jean won a recipe contest for her "Bukovinian Natchynka with Smorzhee in Sour Cream", a cornmeal casserole topped with wild morels in a sour cream sauce, that was demonstrated on Food Network.

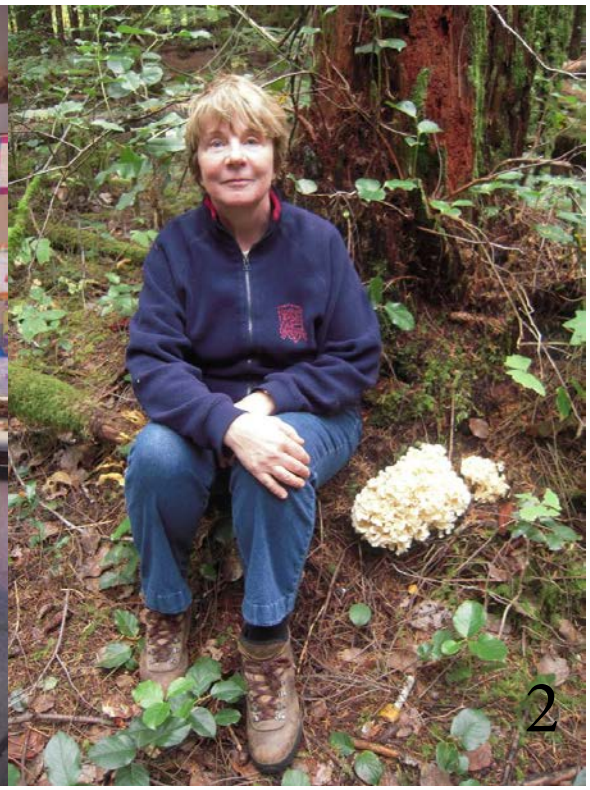
Jean and Steve embarked on epic hunting and foraging tours of the province in search of elusive fish, fowl and fungi, and often travelled to far-away places where Jean participated in forays and courses. Then she reported back and linked us up with other associations. Jean did presentations to SVIMS on 'Mushrooms down under' using pictures taken during her trip to southern Australia and Tasmania, and on 'Mushrooms and their Habitats in the Amazon Jungle of Brazil'. She particularly loved going to the Alberta Foray and even participated in a NAMA foray there. In Smithers she took a mushroom identification course given by Marty Kranabetter which led to an invitation to him to speak to SVIMS.

In between all of this, Jean happily phoned members to raise participation in events, sold T- shirts, helped in the kitchen after the Survivor's Banquet, and assisted on beginners' forays.

Jean was a great help in the Herbarium at Pacific Forestry Centre. Brenda Callan of the PFC says, "Jean enabled us to add hundreds of specimens to the collection. Shortly before Jean started volunteering, I accepted a couple of large cabinets full of fungi from the University of Victoria that would have otherwise wound up in a dumpster. The cabinets housed the collections and teaching specimens accumulated by the late John Paden, former mycologist in the Biology Department at UVic. We couldn't allocate staff hours to enter data, create labels and file specimens for such a large collection, so I asked if anybody in SVIMS might be interested in volunteering some time. Jean cheerfully stepped up, and she spent many hours working in the collection to add the Paden specimens."

After her diagnosis with ovarian cancer in July 2012, Jean began her generous donations to the SVIMS library and to meetings prizes. Jean dreamed up the SVIMS 'Most Beautiful Stinkhorn photo contest' and a 'Spore Print art contest' and then donated the prizes for both. Most recently, Jean and Steve initiated and generously donated to the Oluna and Adolf Ceska Award in Mycology Endowed Fund at UBC; the award will be provided annually to a student to support mycological research on the mushrooms and fungi of British Columbia.

Jean was an inspiration to us all and is sorely missed.



PREZ SEZ

By Bruce Pendergast

I see 2016 as a year we will finalize several updates to the clubs administration which were started in the last few years.

In 2014 we introduced policy and procedures and a waiver designed to improve safety of members and the public in general, and also to legally protect those responsible for running the club. At the board meeting on Feb. 15 we had unanimous agreement to refine what has already been done with clearer policy and procedures and a shorter clearer waiver. These refinements were done by one of our members who is a lawyer.

We have also decided to make SVIMS a registered society. Society status confers several advantages including facilitating fund raising through wills and corporate donations as well as providing legal protection for Board Members. This will mean the society becomes legally responsible for safety rather than the individual board members as is now the case.

In my opinion these changes are greatly overdue and without them it will be increasingly difficult to get anyone to be willing to conduct the club's affairs, because of the legal risks involved. While we hope that accidents will not happen, it is contingent on us to do our best to ensure safety of members on outings such as forays and to ensure individuals are not held legally responsible for mishaps for which they had no control.

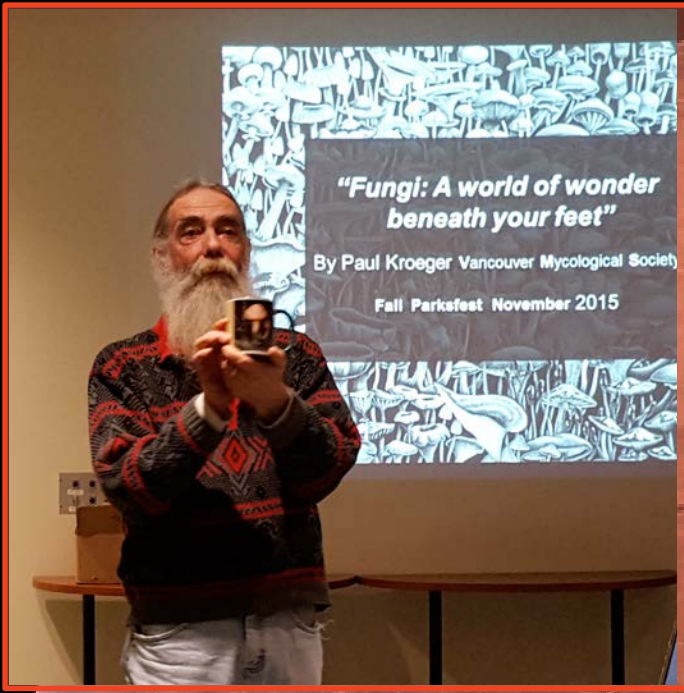
The South Vancouver Island Mycological Society will soon fulfill the last word in its name.

Send Fungifama your photos, articles, comments and ideas!

The next deadline for submissions is July 15

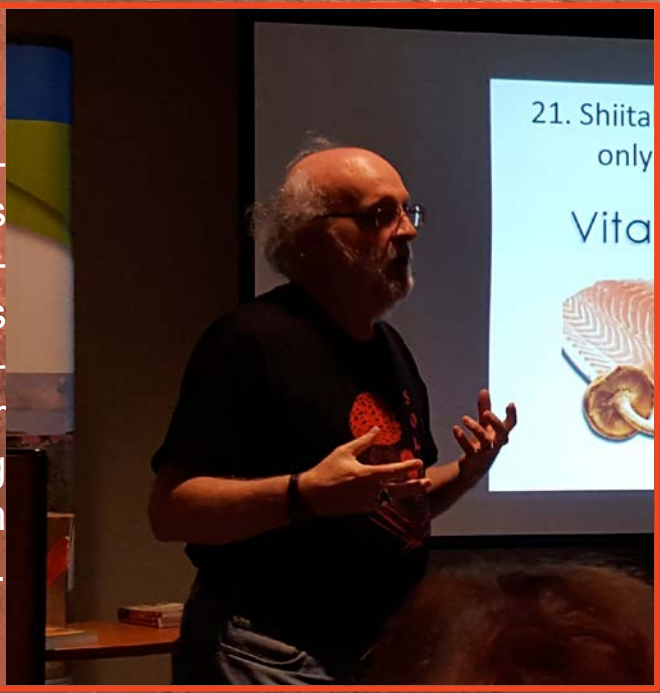
email fungifama@gmail.com

THE COVER ILLUSTRATION IS A DEPICTION OF "FUNGUSMAN", A MYTHOLOGICAL CHARACTER IN HAIDA LORE. THE PIECE WAS GENEROUSLY PRODUCED AND DONATED TO FUNGIFAMA BY ARTIST SHAWN O'KEEFE, AND IS INSPIRED BY THE WORK OF CHARLES EDENSHAW. SHAWN HAS BEEN THE ARTISTIC POWERHOUSE BEHIND PHILLIPS BREWING AND MALTING CO. SINCE ITS INCEPTION. HE RUNS ARTIFICIAL FLAVOUR GRAPHIC ENGINEERING, A VICTORIA-BASED DESIGN COMPANY. HIS ART IS ONE PART IRREVERENT PSYCHEDELIA, TWO PARTS REVERENT PACIFICANA. YOU CAN FIND MORE OF SHAWN'S WORK AT WWW.TRUST36.CA.



THANK YOU to Paul Kroeger for kicking off our 2016 speaker series! This time Paul gave a succinct summary of the life cycle, diversity and general wonder surrounding our familiar fruiting friends. Much of the information in Paul's talk can be found in a newly published guide to mushrooms on Haida Gwaii entitled The Outer Spores: Mushrooms of Haida Gwaii, coauthored with Bryce Kendrick, Oluna Ceska and Christine Roberts. Paul was also recently honoured by having a mushroom named after him: *Cortinarius kroegeri.* Congrats Paul!

Another big THANK YOU to our second speaker at the February meeting: Robert Rogers delivered a spirited explanation of 21 common myths surrounding medicinal mushrooms that he has encountered in his career spanning decades. If anyone missed this event or wanted to review some of the many surprising myths Robert busts, the list can be found in the summer 2015 edition of Fungi Magazine.



Can Spores Survive on MARS?

European Space Agency researchers have published a study in *Astrobiology* (October 2015) continuing their work in exposing hardy fungal spores to Mars-like conditions. This time they isolated rock-inhabiting spores of *Cyrptomyces antarcicus* and *Cryptomyces minteri*, both found in Antarctica. The spores were exposed to controlled atmospheric conditions simulating Mars' harsh environment for 18 months. The samples were retrieved and then plated to see if they were still viable. The results? 60% of the spores still had a high degree of membrane integrity, and 10% were still able to form viable colonies. Perhaps Matt Damon isn't the only organism that can survive on Mars...

UPCOMING EVENTS

MARCH 19: SVIMS ANNUAL CHINESE MUSHROOM DINNER, GOLDEN CITY RESTAURANT, 6PM.

APRIL 7: SVIMS MONTHLY MEETING, PFC.
SPEAKER: JACKLYN DEE

MAY 5: SVIMS MONTHLY MEETING, PFC.
SPEAKER: MATTEO GARBELOTTO

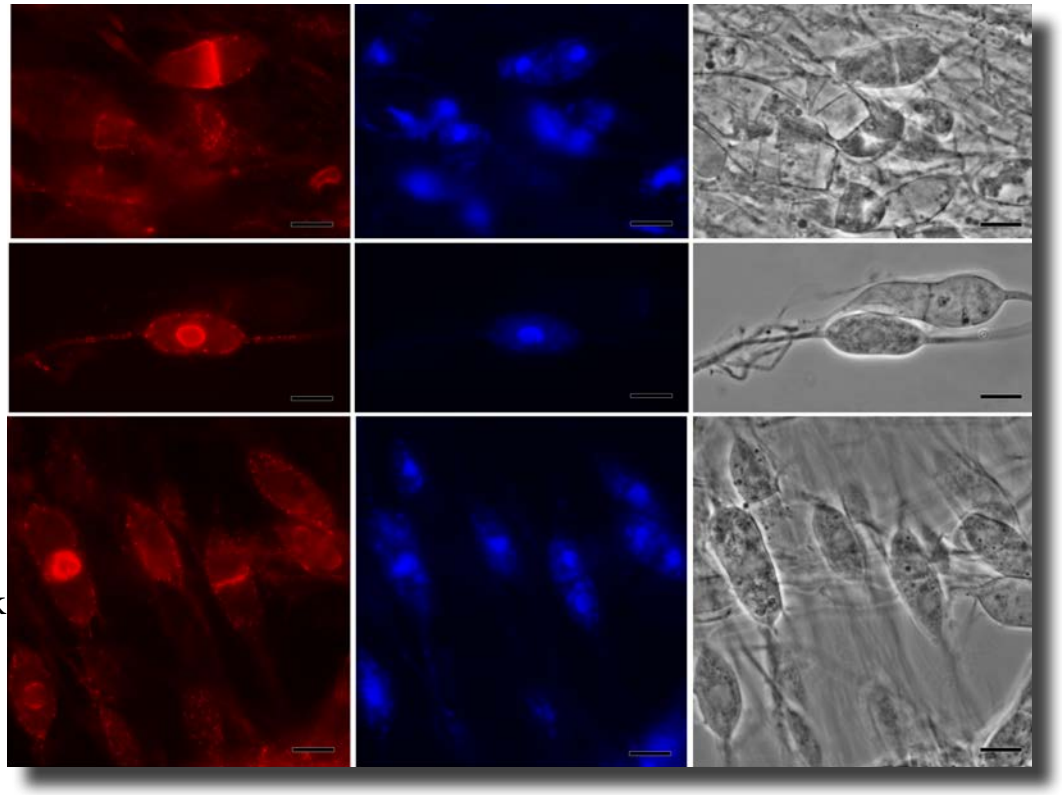
SEPTEMBER 1: SVIMS MONTHLY MEETING, PFC.
SPEAKER: TBD

April's SVIMS Headliner: Jaclyn Dee, M.Sc.

"Body Building with the Fungi: Insights into the Evolution of Filamentous Growth from the Chytrids"

The Fungi have fascinated Jackie ever since she recorded a mock radio show about them for a science project when she was in the 6th grade. Accordingly, she has spent her entire adult life at the University of British Columbia studying Fungi in some capacity.

Jackie is currently pursuing her doctorate in the Department of Botany under the supervision of Dr. Mary Berbee. Her thesis work examines the genetic and cellular mechanisms that shape fungal bodies.



Cladochytrium plates. Photo Credit Jaclyn Dee

When she is not in front of a microscope or a computer doing science, Jackie enjoys cooking, reading classical literature and sci-fi/fantasy novels, being creative and teaching other people about the natural world (often using terrible puns).

At her April 7 talk, Jaclyn will provide some background information about the biology of chytrid fungi and share some of her most recent research findings.

"In biology, as in modernist architecture, form follows function. Familiar fungi like butter-kissed chanterelles are made of filamentous cells known as hyphae. The tubular and threadlike shape of a hypha allows a fungus to explore its surroundings, to penetrate food sources, to form mycorrhizal partnerships and to mate. "Our current understanding of the mechanisms that drove the evolution of filamentous growth is based entirely on a handful of well-studied model molds. However, the lesser-known "chytrid" fungi demonstrate a range of filamentous shapes that fall somewhere in between hyphae and single cells.

"Comparing the cellular organizations of aquatic, chytrid fungi with those of their famous moldy relatives will inform our understanding of how filamentous forms arose in the Fungi allowing them to occupy a seemingly endless variety of ecological niches."

We look forward to hearing all about it!

NAMA: The North American Mycological Association

by Gary Sakayama

SVIMS renewed its 2016 membership as 1 of over 80 mycological associations across the United States, Canada and Mexico that are affiliates of the North American Mycological Association (NAMA). Now in its 49th year, this non-profit organization of professional and amateur mycologists and mycophagists (wild mushroom foragers) is dedicated to the science and education about fungi, promoting biological integrity, and sustainable harvesting.

As an example, NAMA publishes the Mycophile, a bi-monthly newsletter that can be freely viewed/downloaded at their website, with back-issues going back to 2003.

If you take the time to peruse them you can't help but notice the strong thread of Canadian contributors. The Nov-Dec 2015 edition featured Dr. Andrus Voitk of Foray Newfoundland and Labrador as the winner of the 2015 Gary Lincoff Award for Contributions to Amateur Mycology.

The same edition contained a 3½ page spread about the Pacific Northwest Key Council's fall foray in Olympic National Park. Among the Key Council luminaries were names familiar to SVIMS – Oluna and Adolf Ceska, Ian Gibson and Paul Kroeger. In the article's opening paragraphs, Ian Gibson's Matchmaker is cited as exemplifying the work of the Key Council.

So, if you can poke around the public side of their firewall, why would you want to become a member of NAMA?

Far from being a clearinghouse for mushroom clubs, NAMA boasts over 1,500 individual/household members who are eligible to participate in an annual conference/foray hosted in a different part of North America each year, in addition to countless regional forays.

Why are we publishing this article in Fungifama?

By virtue of SVIMS' membership as a NAMA affiliated club, SVIMS members are entitled to a discounted US$25 fee for individual membership. For a more complete description of what NAMA membership offers and details of the discount visit http://www.namyco.org/join.php

One Grew Into the Cuckold's Nest

by Euan Thomson

If you thought the problem of unknowingly raising someone else's young was limited to cuckoo birds and workaholic men, you may have missed the last decade in the burgeoning field the Fungifama newsroom is thrilled to [finally!] dub Mycocuckoldry.

Reticulitermes termites have long been known to harbour parasitic termite ball fungi (TBF) among their egg brood - a great strategy for the fungi, as they receive a warm, safe home in which to let someone else raise their young. TBF, relatives of the *Claviceps* genus of horrifying insect pathogens, hide out among the eggs by disguising themselves with similar shapes and with chemicals similar to those exuded by the eggs to identify themselves. As reported in the January, 2015 issue of *Ecological Research,* eggs of *Reticulitermes* fight back against their TBF doppelgangers by secreting as fungicides the same chemicals used by the termite queen to flaunt her fertility. Two compounds were identified by Kenji Matsuura and Takeshi Matsunaga that both slow the rate of fungal ball germination and inhibit the growth of TBF mycelium in a laboratory setting.

Fungus balls (red) hiding out among the real eggs (white) in a termite colony.

Here are step by step instructions to succeed in your new life as a TBF, should you choose to forsake your rather spoiled existence as Vancouver Island mushroom enthusiast: Gain access to a termite colony through whatever means necessary. Produce chemical cues that signal a worker termite to bring you to the egg pile. Enjoy a luxurious youth of sometimes overbearing but always loving attendance by the worker termites while having your growth and germination suppressed by the jealous and suspicious authentic termite eggs that make up your cohort. When you reach your rebellious teens, shrivel up into an unrecognizable sack and hitch a ride to the nearest refuse pile on the back of your now-scornful worker attendant. Once there, begin germination. Give birth to a new fungus ball that appears and smells just like the eggs. It will be rescued by a worker termite and whisked triumphantly to the egg pile. The odd time, of course, things don't work out among the youngsters, and a termite ball is forced to myceliate in the egg pile. It's the parents' fault, really, since they haven't equipped their frustrated brood with the right defenses to fight off the TBF. Matsuura and Matsunaga were able to show variation in the activity of the two egg-produced defense molecules against TBF strains isolated from different termite nests. This variation in resistance to the chemicals by the different strains prompted the authors to suggest that the chemicals initially evolved as defense molecules against the parasitic fungi, and were later adapted for use as communication signals. This strategy (known among ecologists as "parsimonious evolution") conserves resources, as both communication and defense chemicals are costly to produce.

A heartwarming story of a good parasite, that, like a good dinner guest, tries not to overindulge and *NEVER, EVER* consumes its host.

When the suppressive action of defense molecules isn't strong enough, fungus balls myceliate and consume termite eggs.

Source: Matsuura, K., and T. Matsunaga. 2014. Antifungal activity of a termite queen pheromone against egg-mimicking termite ball fungi. Ecological Research 30:93–100.

Alzheimers Brains Carry Fungal Infections

by Thomas Witte

Beware, fellow SVIMS mycophiles: having mushrooms on the brain can produce a serious prognosis for an unlucky few!

According to the authors of a study published in the October 2015 issue of *Scientific Reports*, multiple species of human pathogenic fungi colonized human brain tissues of Alzheimers Disease (AD) patients. When healthy brains were studied, all fungal components were absent. These findings suggest a new avenue for research into AD risk factors, causality, and the diversity of patient clinical symptoms.

The aetiology of AD remains elusive. The prevailing model is the so-called "amyloid hypothesis", focusing on the buildup of intracellular tangles of tau protein, and extracellular aggregates of amyloid protein, in brain tissues. Ultimately, these aggregates (and biological processes surrounding them) conspire to cause the death of neuronal cells.

Therapies aimed at disentangling aggregates have unfortunately had little success in reversing AD symptoms or progression, suggesting a lack of understanding as to causality of the disease. Research has expanded to focus on a wide range of topics, including viral and bacterial infections, as well as studies of the blood brain barrier, a highly controlled biological barrier preventing undesired pathogenic border crossings into our precious brains.

Using a combination of immunohistochemistry analysis and fungal DNA amplification techniques, the authors of the study were able not only to visualize fungal matter inside brain cells exhibiting a variety of morphological characteristics (see Figure 1), but also to provide a list of likely species paired with their locations in brains.

This list consists of almost a dozen different pathogens, including *Candida abicans, Candida tropicalis, Malassezia globosa, Malassezia restricta, Saccharomyces cerevisae* and *Sclerotinia borealis.* While the list isn't considered exhaustive and is the result of studying a relatively small sample size of afflicted brains (n=11), it is significant that no fungal matter was found in any of the control group (n=4). No single species was present in all brain regions studied, and several species were frequentlyfoundco-inhabiting the same region.

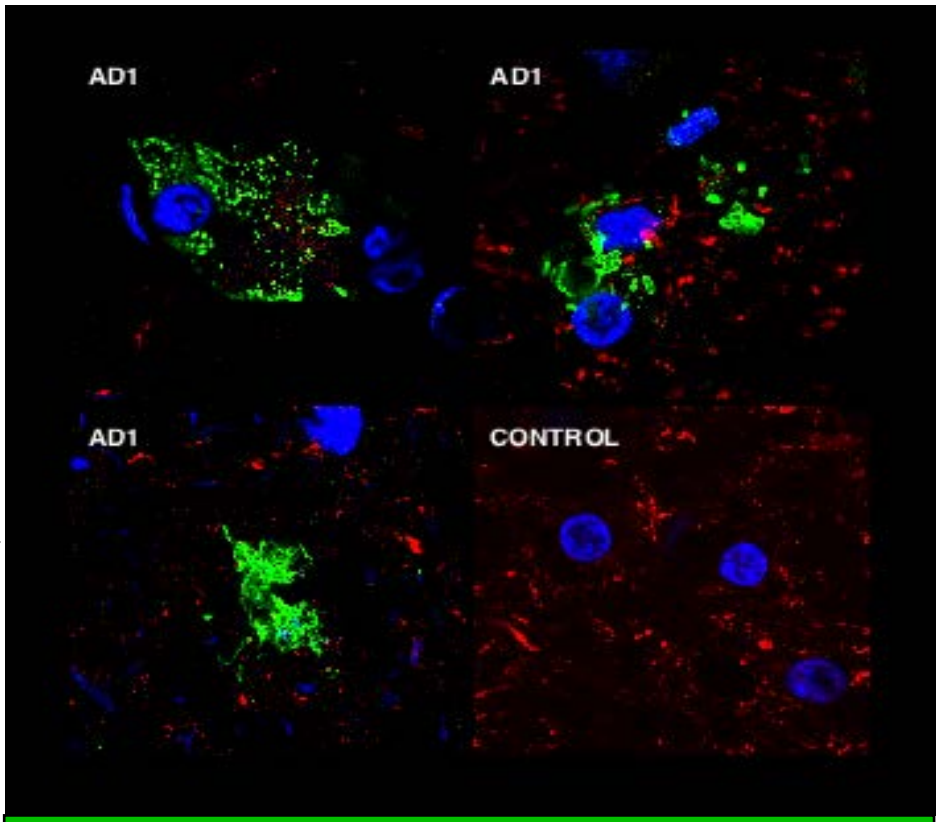


Figure 1. Analysis of fungal structures in brain tissue using immunohistochemistry. Brain tissue from a control individual is negative, while several samples from one patient with Alzheimer's disease (AD1) are positive. Cellular nuclei are shown in blue, fungal structures are in green and neurofilaments are in red. (D. Pisa and L. Carrasco).

While this study cannot claim to answer profound questions of Alzheimer's Disease causes, it helps open a novel line of research and contributes to a growing body of knowledge surrounding the human "mycobiome", an idea we aim to pursue in future issues of Fungifama. Addressing fungal infections could provide a means to at least alleviate some of the common symptoms of Alzheimer's disease, such as inflammation and immune system activation. More research is clearly needed!

Source: Pisa, D., R. Alonso, A. Rábano, I. Rodal, and L. Carrasco. 2015. Different Brain Regions are Infected with Fungi in Alzheimer's Disease. Scientific reports 5:15015.

Fertilizing Field Mycology with Citizen Science

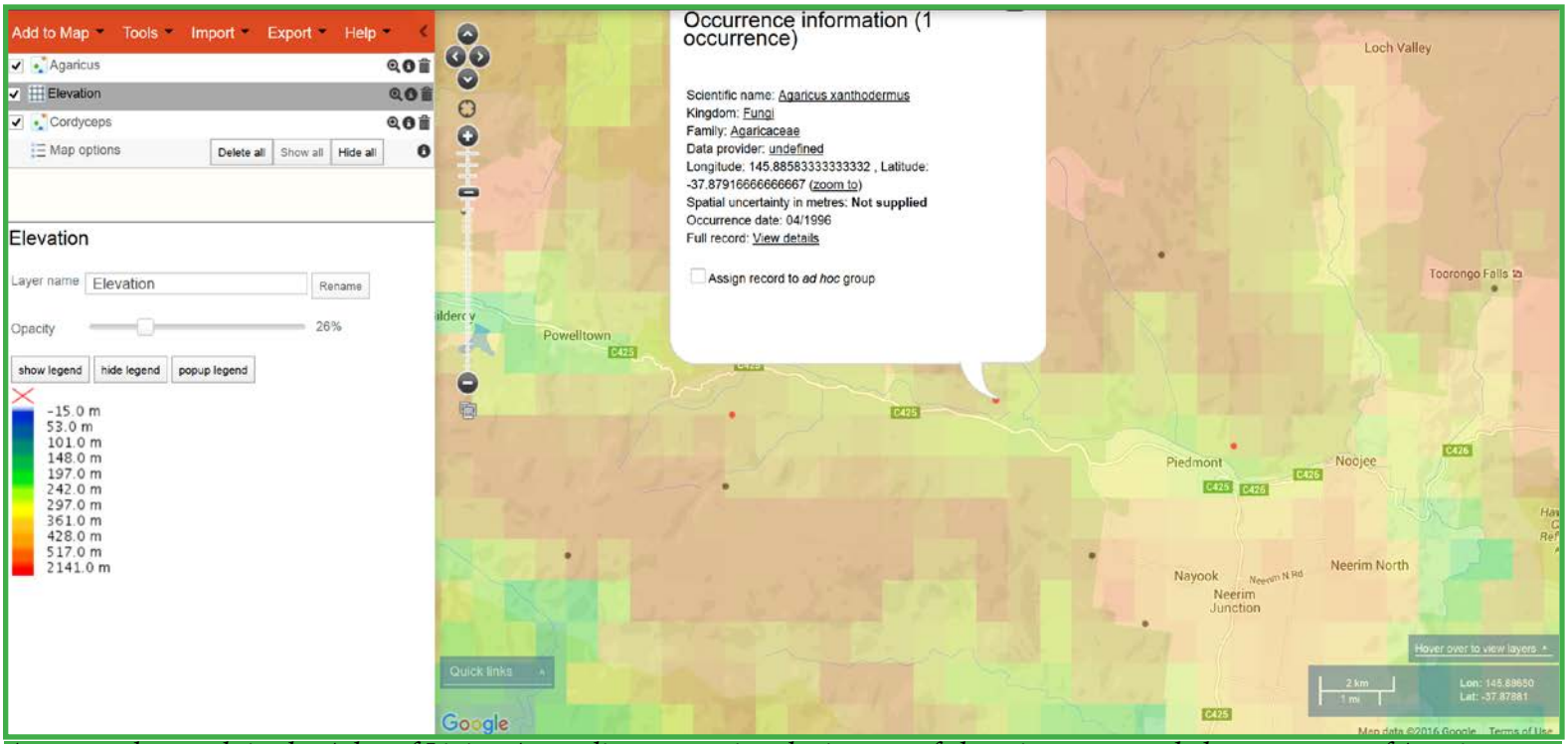
by Euan Thomson

In a recent issue of IMA Fungus, mycologist Marieka Gryzenhout made a compelling call for increasing the involvement of citizen scientists in South Africa to supplement the underfunded and underappreciated professional academic efforts in field mycology. The country's rich mycological diversity and the importance of fungi to ecological webs merit far greater public attention, Gryzenhout argued, and the way to increase that attention is to create new ways to include citizens in the scientific process to broaden the community of stakeholders in matters of mycological interest.

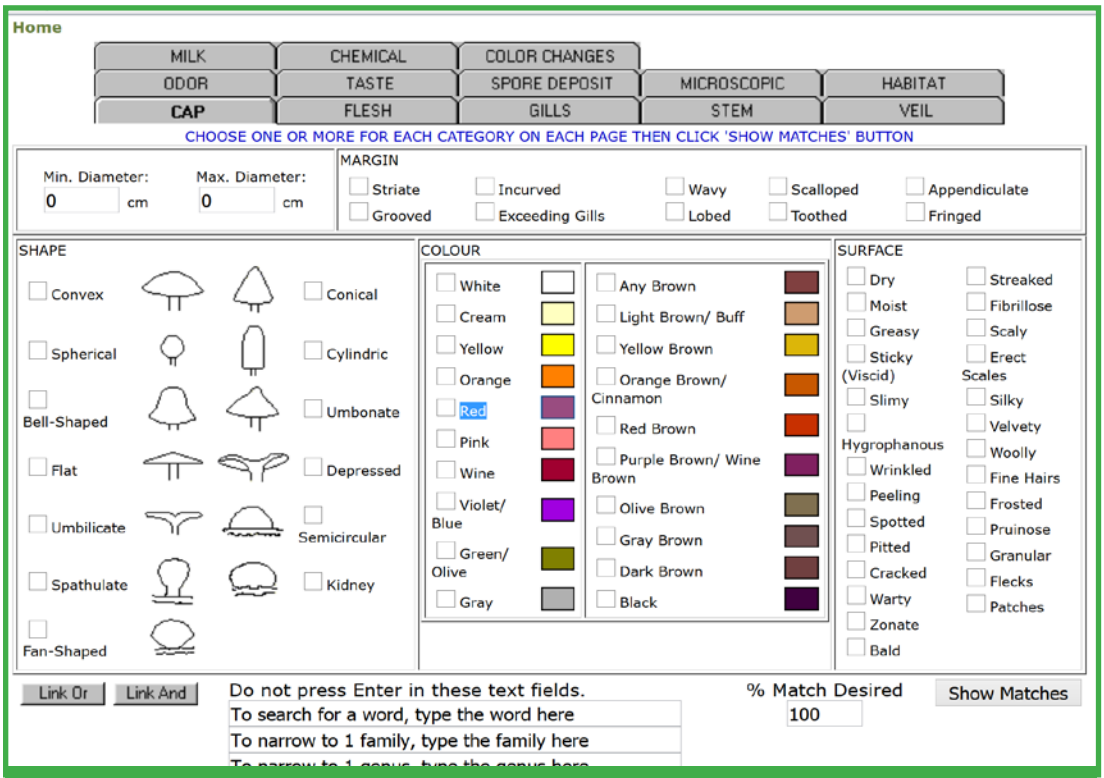
The feature article in the January issue of Fungifama ("Mycosilva: Chaining Liberty or Championing Diversity?") described a state-regulated mycotourism program in Spain that attracts thousands of visitors each year, guided by experts in species identification. The mushroom harvesting component relies on a publicly available species distribution map describing where and when harvestable mushrooms might appear based on past occurrences and environmental data. In the Pacific Northwest, such information is often guarded with a certain degree of jealousy. Whether or not private knowledge could be expected to drive open public lands to resource harvesting by the public is another matter.

Leaving that argument to the kitchen tables of mushroom harvesters, one obvious approach to involving citizens in field mycology is to harness the expertise most of us carry around in our pockets. The smartphone is among the most powerful scientific instruments when deployed on a mass scale by users applying well-designed tools. Take, for example, Fungimap, an organization in Australia responsible for uploading over 107,000 fungal identification records to the Atlas of Living Australia (ALA) database. The ALA is accessible to the public through a website and dedicated phone app, and combines species occurrence records with environmental parameters to yield insights into hidden patterns.

The Matchmaker app, developed by long-time SVIMS member Ian Gibson in partnership with the Canadian Forest Service, represents an excellent tool for specimen identification both in the field and after a foray. Drawing from identification keys developed by the Pacific Northwest Key Council, Matchmaker allows users to specify a wide range of parameters from cap size and colour to aroma and texture. A given search yields a list of possible identities, which can be long or short depending on the level of detail provided in the search parameters. With this degree of precision in the hands of amateur enthusiasts, the door is wide open to scale up accurate data collection that would benefit professional and amateur mycologists alike.

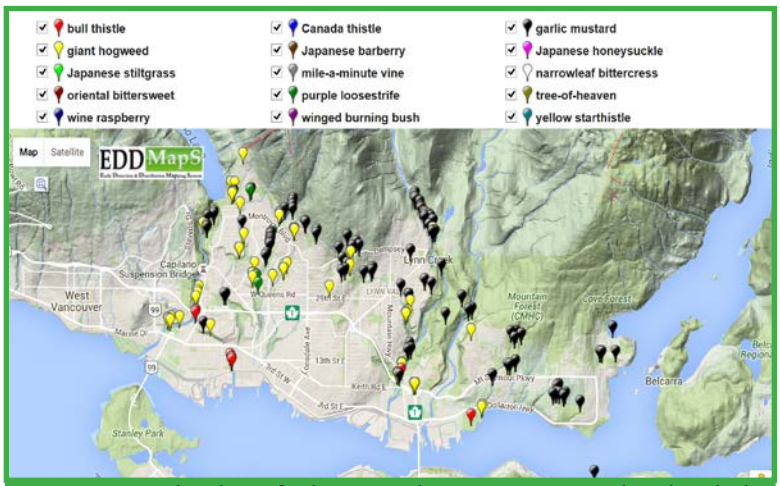


An example search in the Atlas of Living Australia, comparing the impact of elevation on recorded occurrences of Agaricus *(red dots) and* Cordyceps *(black dots) in an area near Melbourne. While* Cordyceps *is known to inhabit regions of higher elevation, in this case* Agaricus *occurrences concentrate along a valley. Elevation is depicted from blue (lowest) to red (highest), as shown to the left. An occurrence is highlighted to display some of the data collected in each case.*



With hundreds of selections to make from among dozens of parameters in Matchmaker, the correct identification is literally at your fingertips.

Other tools that could integrate handily into a comprehensive database include a range of mobile phone apps such as What's Invasive, developed by the University of Georgia for real-time monitoring of invasive species through the Early Detection and Distribution Mapping System (EDDMapS). The app relies on users uploading GPS data, photographs, and observations to EDDMapS. The species identification is then confirmed by experts and made publicly available along with the location and time of observation. For invasive species monitoring, this sort of tool is invaluable, as it provides early warning for the movement of species into new regions. A mycological tool with parallel functionality is Mycoportal, which integrates archives from American and Canadian collections and provides the data in map form. A cursory search for *Claviceps* in British Columbia reveals nine specimens, all curated by Paul Kroeger. Adapting a tool such as What's Invasive for use in mushroom identification, and then integrating it with the Mycoportal archives, weather data and known plant ranges would build a species distribution map eventually capable of predicting fruiting occurrences based on past fruiting events, recent weather activity, weather forecasts and the presence of known mycorrhizal partners.



Invasive weeds identified in North Vancouver and uploaded to the What's Invasive app developed by the University of Georgia.

Finally, Mushroom Observer came online in 2006 and contains a great diversity of foray lists, photographs, observations and other data from across North America. With the capacity for building species occurrence maps, programming automatic email updates on species occurrences, and discussing mushroom identities in a community format, Mushroom Observer is central to the activities of many mycologists. Among these are SVIMS members and frequent Mushroom Observer contributors Oluna and Adolf Ceska, who count over 1500 species in their Life List of the 13,000 observed species on the site. However, it suffers from a confusing naming system and a lack of supporting evidence for many observations. Adolf Ceska elaborated that "you cannot beat [MO] as a system for documenting your real collections", but laments that "only about 17% of them have supporting herbarium specimens" - a weakness that needs to be addressed in designing any scientifically useful database, perhaps by including a filter to remove lower quality occurrences from a given search.

Combining these available technologies with an eager public could lay the groundwork for the public knowledge economy envisioned by programs such as Mycosilva. Meanwhile, opportunities for uncovering patterns in the data would open up for scientists limited by the cost of conducting fieldwork, particularly as the database gained quality parameters to filter for the most reliable, specimen-backed and peer-reviewed observations. For a region as rich in mycological diversity and brainpower as the Pacific Northwest, there would seem to be endless questions one could ask of a sufficiently large species map overlaid with topographic, climatic, land management and physical data. With adept mycologists combing the database, the opportunities to identify new species, new ranges, and new habitats might increase dramatically. Powerful ideas, in principle; in practice, who will be first in line to reveal their patch?

A Fungifama Research Exclusive

Stumbling on a Golden Opportunity at Bamfield Marine Science Station

By Tobis Agrell and Daniel Zayonc

When given the opportunity to carry out a research project at a world class Marine Science Centre, Tobis Agrell (Lund University in Sweden) and Daniel Zayonc (Simon Fraser University) ventured into the nearby secondary growth forest to study *Cantharellus formosus*, the Pacific Golden Chanterelle. Inspired by the Bamfield Fungus Festival that occurred in September 2015, they noticed that the delicious *C. formosus* appeared to develop different morphologies depending on their proximity to trees. Keen on describing and understanding this phenomenon, the undergraduate students developed an experiment to investigate if microclimate influences morphologies of *C. formosus,* and if so, if it affects their ability to disperse spores.

Daniel Zayonc and Tobis Agrell show their stipes.

Nutrient cycling through fungal symbionts is the basis upon which terrestrial ecosystems thrive[1], with up to 94 percent of trees depending on a healthy mycorrhizal relationship[2]. For this reason, studying the life history of fungal communities is essential to understanding the underground processes shaping forests all over the world[2].

Chanterelles are found within the phylum Basidiomycota, characterized by a filamentous structure and use of haploid basidiospores for sexual reproduction[3]. Their ability to efficiently disperse spores is critical for reproduction[4] and dispersal has been connected to several fitness advantages[5,6]. While up to 95% of basidiospores land within a meter of the sporocarp (fruiting body)[7], most fungi can achieve longer distance dispersal thanks to the sheer number of spores produced -- up to one billion per sporocarp[8]).

The shape of the sporocarp is an important factor affecting the dispersal success of individual fruiting bodies. Sporocarps with wider caps are able to produce more spores[4] and sporocarps with longer stipes can achieve greater dispersal distances[7]. However, these advantages come at a cost, since growing a large cap requires a disproportional increase in sporocarp biomass[4]. Several biotic and abiotic factors affect sporocarp morphology: mycorrhizal interactions improve carbon supply, allowing larger growth[14]; warmer temperatures and more precipitation increase growth rate and abundance of the genus *Cantharellus*[9]; and increased light levels can induce stem elongations of sporocarps in chanterelles[10].

C. formosus is a commercially important species in the Pacific Northwest and is often the subject of investigations[11]. Shannon Berch, SVIMS director at large, explained to Zayonc and Agrell that the influence of microclimate on fungal life history is largely unstudied would be a novel project for their Directed Studies class at Bamfield Marine Science Centre.

The ability for a species to alter its morphology in order to make up for restricted dispersal is widespread[12]. The students hypothesized that *C. formosus* sporocarps located in microhabitats restricting their dispersal (under structure) would adapt their morphology to account for this hindrance. Sporocarps in these restricting microhabitats might allocate more resources to growing taller, and thus increase the dispersal distance of their spores[7]. In contrast, sporocarps in unhindered microhabitats (open space), such as an open patch of forest, might invest more resources into other aspects of their morphology, while maintaining successful long distance dispersal. For example, increased stipe width might lead to the sporocarps being less damage prone[6]. Further, growing a wider cap would increase spore production and thereby enhance dispersal.

Open space (above) and under structure (below) C. formosus *specimens.*

After first measuring (and then consuming) over 200 specimens, the results revealed morphological differences between the two designations (open space vs. under structure). It was found that *C. formosus* located in open spaces grew shorter and thicker compared to those located under structures, which grew taller and thinner (Fig. 1). Meanwhile, sporocarps growing under structures had statistically significantly larger caps compared to those growing in open space for a given stipe width (Fig. 2). These findings sug-

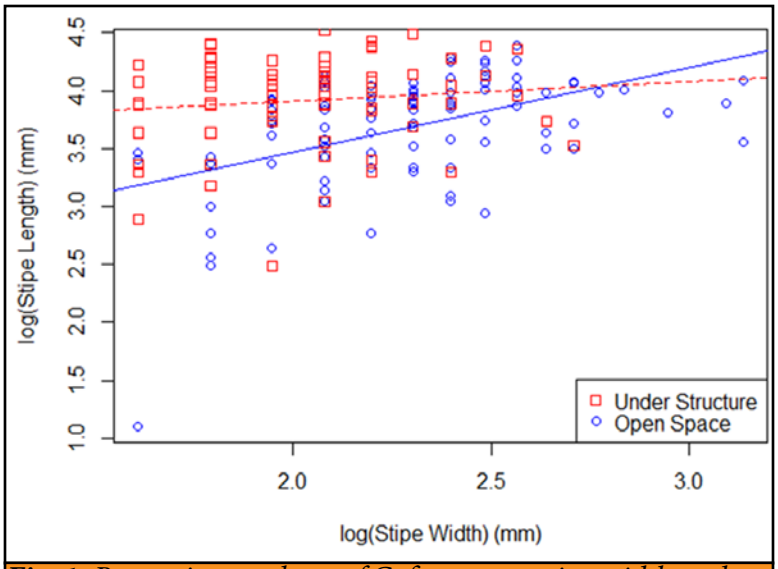


Fig. 1. *Regression analyses of* C. formosus *stipe width and stipe length for under structure (red; n=79) and open space (blue; n= 97) designations.*

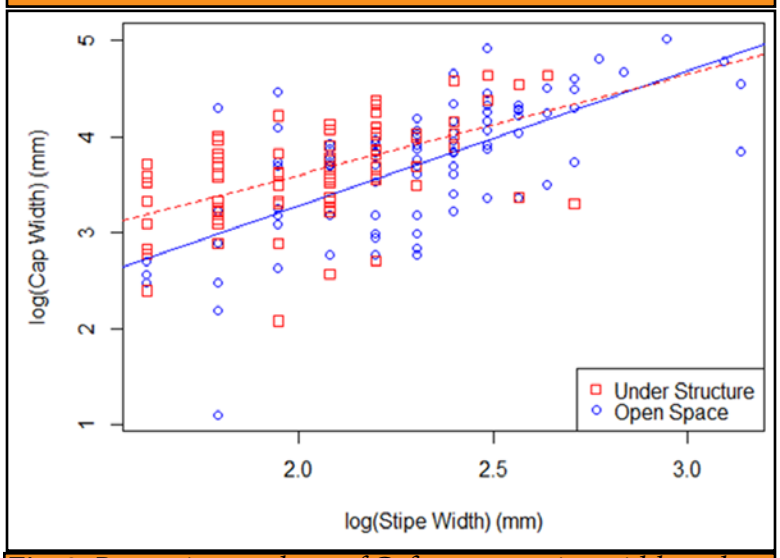


Fig. 2. *Regression analyses of* C. formosus *stipe width and cap width for under structure (red; n= 79) and open space (red; n= 97) designations.*

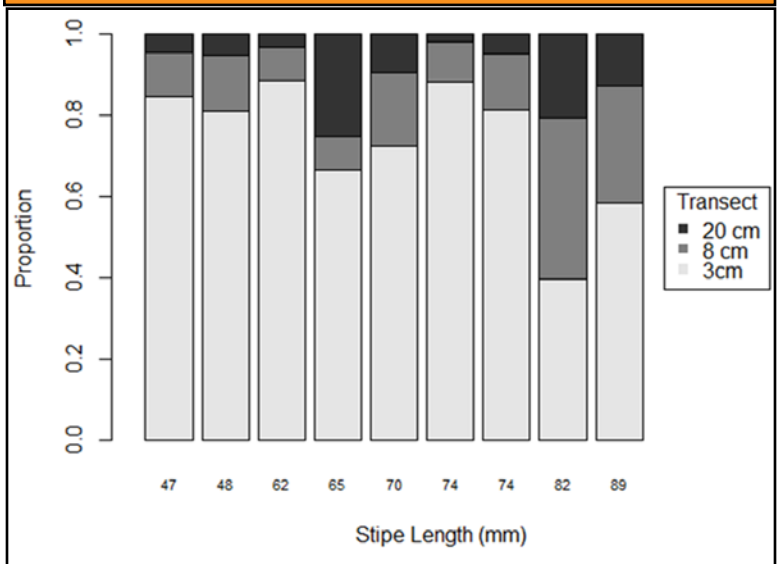


Fig. 3. *Proportions of spores falling on slides in laboratory transects located 3cm, 8cm and 20cm away from* C. formosus *sporocarps of specific stipe lengths (n=9 sporocarps).*

gest that resource allocation in sporocarp development primarily depends on the sporocarps' ability to withstand disturbances by growing a thicker stipe, and that enhanced dispersal by growing a larger cap and longer stipe are of second priority.

To test if longer stipe correlated with enhanced dispersal, Zayonc and Agrell measured spore dispersal as a function of stipe length in the field and in a laboratory setting. They placed microscope slides at distances of 3cm, 8cm and 20cm from sporocarps of varying stipe lengths and then counted the number of spores landing on each slide. While no significant relationships emerged, the laboratory format found more spores landing at the 20cm transect as stipe length increased (Fig. 3). This indicates that the sporocarps residing under structures are simultaneously restricted in dispersal ability but protected from stressors (wind, precipitation and animals), allowing them to allocate resources into growing both tall and wide to increase their overall reproductive success.

The process of conducting a research project was a fulfilling experience for the young mycologists. The terrestrial project may have puzzled their marine biologist peers but everyone in the BMSC fall program came to develop a taste for the golden bounty that our forests provide. Understanding how chanterelles adapt to their environment is an exciting venture for any mycologist, but the true joy is sharing an interest in the outside world and reconnecting people -- and mushrooms -- to their roots.

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HELVELLA - "ELFIN SADDLES" Part 1/2: Fluted Stems

By Ian Gibson, photos by Michael Beug

Some people may have been surprised at the Victoria Mushroom Show last fall that there was no *Helvella lacunosa* on the table. Well our old friend, the fluted black elfin saddle, was there, but hiding by the nametag *Helvella vespertina*. The molecular wizards determined that our fluted black elfin saddle is different from the European fluted black elfin saddle called *Helvella lacunosa*.

Also discovered was a new fluted black elfin saddle, *Helvella dryophila*, described from California and Oregon under oak, usually fruiting in the spring. It has since been found as far north as Seattle, according to Michael Beug. Can anyone spot it here in British Columbia?

An Unidentified *Helvella Sp.*

Helvella dryophila is similar to *H. vespertina* (which we used to call *H. lacunosa*) but 1) the host is different (oak instead of conifers), 2) the fruitbodies are only up to 8.5cm tall, and 3) fruiting tends to be in spring rather than in fall (for *Helvella vespertina* it is the other way round).

Not only that, but a fluted black elfin saddle that is reminiscent of *Helvella dryophila* has been found this spring associated with conifers. Michael Beug would like to hear some British Columbia news about that one too: "From a distance it looks like Helvella dryophila, but this species is associated with conifers, not oaks. Also the stipe is much fatter and very different - it is composed of 1 mm thick tissue folded and pleated (and lacking the strength to hold the cap up very well)… I would love to get a sense of the range of this interesting species."

I hope we can learn more about this last one and give it a tidy Latin name. Otherwise it may forever be the western Washington conifer-loving oak-lover-like spring-fruiting fluted black elfin saddle.

ELFIN SADDLES (HELVELLA) in the Pacific Northwest

Stem fluted and lacunose

SPECIES	HEAD	OCCURRENCE
vespertina	light gray to dark gray; margin usually fused to stem; underside smooth	very common, previously known under *Helvella lacunosa*; fall and spring
maculata	light to dark brown to gray brown, wavy-wrinkled; free from stem; underside densely pubescent to villose	late summer and fall
dryophila	dark gray-black, rarely pale gray, sometimes with some hints of brown; fused with stem in several places; underside smooth	under oak, spring
crispa	white to cream; free from stem; underside finely pubescent to pubescent	summer and fall
lactea	white; fused to stem; underside smooth to at most finely pubescent	summer and fall

'Villose' means 'covered with long soft hairs'. 'Pubescent' means 'covered with short soft hairs'.

Helvella with fluted stems

These *Helvella* species are elfin saddles with fluted stems (the stems have prominent longitudinal ridges). Usually there are also holes in the sides of the stems (they are lacunose). A similar table, not presented in this issue, describes elfin saddles with stems that are round or oval in cross section. Neither table includes the *Helvella* species that have a cup-like form (sometimes called elfin cups). The elfin saddles are those *Helvella* species that have parts of their head's circumference raised up and other parts lowered. In the simplest case, where opposite sides are raised and opposite sides are lowered, the form is quite saddle-like (2-lobed). The head can also be 3-lobed or irregularly lobed.

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Byssonectria fusispora, photo credit Adolf Ceska

Ben Hircock made a rare find on a SVIMS foray to Pearson College: *Byssonectria fusispora*, an ascomycete seen here growing around some needles and moss. This specialist prefers areas of high nitrogen load, a rarity in our coastal soils. Adolf Ceska surmises it is probably growing in a spot where a deer has urinated.

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