

SPORE PRINTS

BULLETIN OF THE PUGET SOUND MYCOLOGICAL SOCIETY
Number 549 February 2019



NOT ONE, NOT TWO, BUT THREE FUNGI PRESENT IN LICHEN

Kerry Grens

<https://www.the-scientist.com/>, Jan. 17, 2019

Up until 2016, lichen was thought to be a partnership between one alga and one fungus, the classic symbiotic relationship. Then came the observation that in fact lichen harbors two types of fungi—an ascomycete and a newly identified basidiomycete yeast.

The team that had made this discovery has now found a third fungal associate in lichen. Reporting in *Current Biology* today (January 17), Veera Tuovinen of the University of Alberta and her colleagues describe wolf lichens (*Letharia*) that are made up of an alga along with three types of fungi: the ascomycete and two basidiomycetes.

*Common wolf lichen.
Its cortex contained
cells from an alga,
an ascomycete, and two
basidiomycetes.*



www.the-scientist.com

“What this means in concrete terms to the overall symbiosis is the big question,” says coauthor Hanna Johannesson of Uppsala University in a press release. “What we are finding now is basically what researchers since the 1800’s would have liked to know—who are the core players, what function do they perform, all the cards on the table.”

The scientists had been investigating which species genomes appear in lichens when they saw one type of fungus, a basidiomycete called *Tremella*, repeatedly pop up. Previously, scholars had only observed *Tremella* in galls, or outgrowths, on lichen. “It was thought to be a parasite,” Tuovinen tells *The Atlantic*. “But we found it in completely normal wolf lichens that don’t have any kinds of bumps.”

The scientists labeled each of the fungi with fluorescent tags so they could visualize the composition of the lichen. The images showed *Tremella* in the outer layer, called the cortex. “With the microscopy, we could visualize the mosaic of different organisms within the lichen,” Tuovinen says in the press release. “We’re realizing that interactions are much more complex than previously thought.”

According to *The Atlantic*, it’s possible *Tremella* is actually a ubiquitous infection of lichens, rather than a member of the symbiosis. Experiments that knock out the fungus could determine its role and whether it’s a critical member of the team. “Without this sort of experimental approach, it seems premature to suggest that *Tremella* represents a 3rd, 4th, or whatever-th symbiont,” Erin Tripp, a lichen researcher at the University of Colorado Boulder, tells *The Atlantic*.

WHEN FUNGI FIGHT BACK

JoAnna Klein

The New York Times, Jan. 15, 2019

It’s known as fight or flight—the message the brain sends your body when it detects something frightening. Something like it happens to plants when they are under attack, too. And then there are fungi—perhaps the most mysterious kingdom of multicellular life.

Fungi too can sense attackers and manufacture powerful weapons to combat them, including the toxins and poisons that can send you to the emergency room if you eat the wrong mushroom.

But little is known about the built-in threat detectors of these limbless, brainless beings. Humans send messages through their nervous systems. A plant’s vascular system is its relay apparatus. But fungi have neither.

Scientists trying to solve this mystery recently grew mushrooms in the lab, unleashed fungi-eating nematodes on them, and videotaped the aftermath. They found that the fungi somehow sensed the predators and sent signals to other parts of their bodies. Their findings, published recently in *Current Biology*, shed new light on how the many cells within even primitive organisms communicate like plants or animals.

“They may appear simple, but they share features that are also known for more complicated organisms,” said Markus Künzler, a microbiologist at ETH Zürich in Switzerland who led the study. “There is internal communication going on that we know very little about.”

What we do know is that fungi-loving nematodes ingest their dinner like creepy, syringe-wielding serial killers. The worm uses a needle on its head to puncture the mushroom’s hyphae—the stringy filaments that make up its mycelium, or vegetative body—and suck out its cellular content.

Under attack, *Coprinopsis cinerea*, the mushroom commonly known as the “gray shag” or “inky cap” and often used in fungi research, puts up a slow, but steady fight.



Markus Kunzler

Nematode piercing the cell walls of a mushroom’s hyphae.

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CALENDAR

- Feb. 12 Membership meeting, 7:30 pm, CUH
Feb. 12 *Spore Prints* deadline (**early**)
Feb. 18 Board meeting, 7:30 pm, CUH board room
Mar. 9 Survivors' Banquet, 6:30-10:00 pm, CUH

BOARD NEWS, Jan.

Luise Asif

A very Happy New Year to you all! The board is moving to implement suggestions made at last year's retreat. Many are already in progress, and we have an exciting year planned. Daniel has done an amazing job lining up an outstanding group of speakers for 2019. But first a bit of unfinished business. A huge thank you from the board and the 2018 Show Chairs—Kim Traverse, Derek Hevel, and Milt Tam—to the amazing group of volunteers who helped make the show such a success.



MEMBERSHIP MEETING

Daniel Winkler

Tuesday, February 12, 2019, at 7:30 pm at the Center for Urban Horticulture, 3501 NE 41st Street, Seattle

Our speaker for February is David Giblin, Collections Manager of the UW Herbarium, who will present "The Burke Museum Fungal Collections: Past and Present Significance and Ideas for Their Future."



David Giblin

The University of Washington Herbarium is the Burke Museum's botanical research collection. Founded in the late 19th Century, the Herbarium comprises five collections: macrofungi, lichenized fungi, vascular plants, nonvascular plants, and marine algae. Of the herbarium's 700,000 specimens, over 75,000 are macrofungi and nearly 32,000 are lichenized fungi. The herbarium's fungal collections are an invaluable resource for professional, academic, and amateur mycologists alike. In his presentation Giblin will provide a brief history of the fungal collections, review the substantial efforts made over the past decade to enhance access to these collections, and discuss ideas about the collections' future.

David Giblin has been Collections Manager of the UW Herbarium since 2002, where he oversees the plant, fungal, and marine algae collections. His research interest is the vascular plant flora of the Pacific Northwest, where he has led plant collecting trips from Washington to northern Nevada, eastward to Idaho and Montana. He has led efforts to database and image the collections, and he led the creation of online resources such as the Consortium of Pacific Northwest Herbaria and the Plants and Fungi of Washington Image Gallery. He is lead editor for the *Flora of the Pacific Northwest*, 2nd edition, co-author of print wildflower guides to the Olympics, North Cascades, and Mt. Rainier national parks, project lead and contributor to the Washington Wildflower and Idaho Wildflower plant identification apps, and editor and board member for the Flora of North America project.

Would people with last names beginning with the letters A-K please bring a plate of refreshments to serve after the meeting?

BOARD NEWS, Feb.

Luise Asif

This year's Survivor's Banquet will be again be a potluck and is planned for March 9. The theme is "Celebrating Mushrooms in Asian Cooking." Invitations will go out in February. Derek Hevel is continuing work on the PSMS cookbook with a goal of starting the printing process this year. The Ben Woo Foray this year is scheduled for the weekend of October 18. Registration will open in July. Planning has begun for the fall show. The comments you provided after last year's event will be helpful in making this year's show even better. A date will be announced soon once it is finalized with the venue. As Kim Traverse, Derek Hevel, and Milton Tam reported, last year's show was a success and helped us end the year on solid financial ground. Sweta Agrawal is working hard administering the Ben Woo Scholarships and K-12 grants. Scholarship deadlines are March 1 and September 1. Remember to vote for 2019-2021 candidates.



It's 2019, the year of the new PSMS cookbook! I am coordinating the publication of a cookbook for the Society, to be printed this summer and to be distributed by and for the profit of PSMS thereafter. The last time PSMS published a cookbook was 1969 and 1973, so this year is the 50th anniversary of the first book and a fantastic time to celebrate mushrooms in cooking. The 200-ish-page book is taking form around PNW foraging seasons and species we find in each season, and will include about 80 mushroom recipes (I have about 40 so far).

Since the cookbook will be a collection of YOUR recipes, I need to get all your favorite mushroom recipes, and hopefully photos of your prepared dishes too. Your recipes can be basic or more involved ones that include lots of other ingredients. They don't have to be perfect, and there's no contest component; we will review all submitted recipes and help adjust if needed. The deadline for recipe-collecting is the end of March at very latest. After that, we will go into design and publication mode, and make the books available for sale in the fall.

Here are the guidelines for submitting recipes:

- (1) Recipes must include PNW wild mushrooms OR common cultivated or store-bought species.
- (2) You must cook the dishes that are described in the recipes you submit. They can be home-cooked dishes or those you prepare for one of PSMS' food events (like the upcoming Survivor's Banquet!).
- (3) Please submit excellent photos of your prepared dishes with thoughtful lighting, colors, and focus, although photos are not critical for your submittal.
- (4) I have enough recipes that include morels, lion's mane, and matsutake, thanks!
- (5) Please submit via email to me at dfhevel@gmail.com.



PSMS cookbook, 1969.

STUDENTS CREATE PROBIOTIC TO HELP HONEYBEES FIGHT DEADLY FUNGUS

Andrew Lyle

Phys. Org., Jan. 10, 2019

A team of University of Alberta students are hoping to market a probiotic they created to help honeybees ward off a fungal infection that has wiped out entire hives.

APIS, short for "antifungal porphyrin-based intervention system," uses a genetically engineered *E. coli* bacterium to produce molecules called porphyrins that damage the spores of *Nosema ceranae*, the most widespread fungus infecting honeybees around the world.

Beekeepers can feed the product to their hives to help eliminate the fungus in the bees' digestive systems.

The students created the product as a project for the 2018 International Genetically Engineered Machine Competition that took place in Boston last October, where they won first prize and a gold medal in the food and nutrition category.

A month after the competition, the team presented their research at the annual conference of the Alberta Beekeeping Commission.

"It allowed us to expose our work to commercial beekeepers and to bee researchers who might be able to pursue further development," said science student and team member Julia Heaton. "We've had interest in our project from some of these beekeepers, as well as from beekeepers who saw our research in the media.

"We have commercial beekeepers who are willing to conduct the necessary field trials to allow commercialization of our project. We've also looked into patenting our system with the help of TEC Edmonton."



UNUSUAL ORCHID, NEVER SEEN GROWING IN U.S., FOUND THRIVING IN WOODS IN PENNSYLVANIA

Maddy Lauria

Delaware News Journal, Jan. 18, 2019

In a private wooded area on the expansive property that houses Longwood Gardens, a unique orchid has quietly taken root.

What makes this fruit-bearing flower, not-so-commonly known as *Cyrtosia septentrionalis*, unique is that Longwood Gardens has never imported the plant, according to their records.

There is no evidence of anyone ever ordering the Japanese orchid, which is impossible to cultivate in normal nursery settings because it is an awfully picky little thing. Over decades of orchid displays and dozens of different species, there is no trace of this particular species coming to the former farm owned by Pierre du Pont in Kennett Square, Pennsylvania.



Longwood Gardens/Duane Erdmann

A Longwood Gardens employee stumbled upon this unique Japanese orchid, *Cyrtosia septentrionalis*, growing in the woods in an off-limit area this summer.

"It's totally unprecedented. This has never been found in the United States," said Peter Zale, Longwood's associate director of conservation, plant breeding, and collections. "I said, 'It can't be true.' How on earth did that thing get into the woods back there? I had to go see it myself."

And he did. And it was the same type of orchid he had been featuring in presentations about Longwood's native orchid program as an example of a non-native orchid that was just too darn picky to take root.

How it got there and how long it has been growing remains a mystery, Zale said. But so far, it doesn't seem to be a threat.

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When Fungi Fight Back, *cont. from page 1*

Künzler and his colleagues paired the fungi and nematodes in a lab setting, and also added a dye to the mushrooms that glows under a microscope. They watched the mushroom's response travel in the form of genes activating, lighting up as its warning message propagated up and down the fungus's fattest hyphae. It did so every few hours—and it switched directions. As they switched on in succession, the genes produced a nasty toxin the nematodes don't like.

It makes sense that to survive, a fungus would need to send defense signals throughout its body rather than only at the site of attack. For example, defending its reproductive caps above the soil, even preemptively, would help its legacy continue.

But much remains unknown about the fungus's signal and how it travels.

"In both plants and animals, electrical and chemical signaling is known," Künzler said. "It's not very clear what happens in the fungus."

Fungal architecture is quite different from that of plants and animals. Künzler's results suggest that the cells within a fungus's hyphae communicate using chemical signals, but additional research will be required to confirm the finding.

"We think the signal has to travel from one cell to another across the cytoplasm of the cells, which is very special or different from how the signaling is done in a plant or animal body," he said.

While fungi may be simple compared with animals and plants, they're multicellular too, and what's the point of making all those cells stick together if they can't somehow communicate.

Nematodes, bah!



Election

For our elections, **we vote online electronically**. Voting ends on March 3 at midnight.

This year we will be voting for a President, a Secretary, and five Trustees for the years 2019–2021. Please read the following candidate profiles carefully.

How to Vote Electronically: Go to the PSMS website at www.psms.org and click on "Members' Page" under the heading "Membership." You will need to log in with your username and password. If you have forgotten your password, please fill out the section "Forgot your password?" at the bottom of the page and click on "Reset your password." If you cannot remember your username, contact Pacita at membership@psms.org or Marian at outreach@psms.org.

Scroll to the bottom of the member's area page to "Member's Area Features." Under the heading "Interaction" click on the link "Elections." This will open the ballot for the 2019 PSMS election. You may now make your selections. Be sure to click on "submit" on the bottom of the ballot when finished.

Please note: Bios in *Spore Prints* may have been abbreviated owing to space considerations. Please see the online ballots for the bios as originally submitted.

Election

It will be helpful to have your *Spore Prints* issue with the candidates and bios available to view when voting. You may only vote once. There are two votes per family membership, but you will each have to log in separately and use your individual user IDs to vote.

If you have any questions or confusion about voting, please contact Marian Maxwell at outreach@psms.org.

Voting by U.S. Postal Mail: We will mail ballots to members who do not have computers. These mailed ballots need to be returned in person at the February meeting to Pacita at the membership desk or to be mailed to Marian Maxwell at 14269 145th Pl SE, Renton, WA 98059. Votes mailed after March 3 will not be counted.

Please contact Marian at outreach@psms.org if you have any difficulties voting.

Results: Election results will be announced at the Survivors' Banquet. These mailed ballots need to be returned in person at the February meeting to Pacita at the membership desk or mailed to Marian Maxwell at 14269 145th Pl SE, Renton, WA 98059.

Election results will be announced at the Survivors' Banquet.

Election



Randy Richardson *President*

I have helped with the annual exhibit for many years, served on the PSMS board, and sometimes help guide field trips. I am curious, and love foraging and bushwhacking, so PSMS is an ideal fit. As president, I hope to be able to make the experience of volunteering as wonderful as possible, to make best use of peoples' time, and to thereby encourage more involvement. "Many hands make light work," and we are all volunteers.

Secretary

Luise Asif

I have served in this past term as secretary on the PSMS board and would be honored to continue serving as secretary for another term. A PSMS member since the mid-90s, I have volunteered for the annual exhibit and various shows and events, and currently have the pleasure of doing the Hospitality for our monthly meetings and volunteer coordination for our club.



Trustees

Debbie Johnson

A member of PSMS since 2014, I have served as the Co-Chair of the Field Trip Hosting Committee and have volunteered at the annual show. I am excited to have an opportunity to serve on the board. I have a special interest in the social aspects of the club, including welcoming new members, field trips, and special events. If it's not fun they won't come!



Derek Hevel

I joined PSMS in Fall 2013 and have been obsessed with mushrooms ever since. As a board member, I hope to continue to contribute to the smooth overall running of the Society, with particular interest in increasing member participation, streamlining group communications, and expanding education about all aspects of mushrooms.



Hans Drabicki

Aircraft engineer and part-time forager, I've been a PSMS member since 2008. Since then the club has become a network of friendships. As a member of the board, I look forward to devoting my time and energy toward developing, coordinating, and promoting those unique PSMS events that bring us all together.



Erin O'Dell

Hi I'm Erin, I'm running for a second term on the board of trustees. I'm an avid volunteer and familiar face on field trips and the yearly wild mushroom show. My interests on the board this year include outreach education to the community. My own mission is to support PSMS in nurturing a connection for people to nature and fun.



Kate Turner

I've been a member of PSMS for three or four years and am excited to run for the PSMS board. I love fungi as food, dyes, cool objects of study, and also artistic inspiration. In my day job, I am an early childhood educator (specializing in nature education) and an artist. As a PSMS board member, I hope to provide more fungi-themed educational programs for children and more fungi art workshops.



Marion Richards

I am a newer PSMS member, but have been coming to meetings and shows for several years now. I enjoy the numerous educational opportunities of our club, the annual shows, field trips, and participating in the Bridal Trails survey. I think fungi are an important and useful component of our environment and I want to share that knowledge.



Molly Swesey

I'm starting my seventh year as a PSMS member. I've taken several classes the club offers, have volunteered with Mushroom Mania, and have been a vendor at the Wild Mushroom Show for the past 4 years. I enjoy foraging and cooking with wild mushrooms. I've learned so much from the club and would like to give back to the organization.



Parker Olson

A recent Seattle transplant, I have experience in finance, neuroscience, project management, and leadership. Mushrooms instantly became a passion and opened my eyes to the abundance of their medicinal and health-related effects. I'm excited to get involved see a lot of opportunity to help modernize group communications and help digitize records and record keeping in an efficient manner.



Scott Maxwell

A PSMS member for many years, I have provided support for many of the PSMS functions, including annual shows, dinners, retreats, field trips, and forays. I just retired as a test engineer from the Boeing Laboratories and would like to take more of an active role helping PSMS inform and educate others about the role of fungi in our environment...as well as promoting fun activities within the club.



Rare Orchid, cont. from page 3

“We monitor the property for invasive species all the time and, as of now, we don’t think this is showing invasive potential,” he said. There are about 10 clumps of the orchid growing in a part of the gardens closed to the public, in an area largely cut off by roads.

“There are not any other woodlands close by for it to escape to,” he said.

Because the seeds of *Cyrtosia* are much larger than many other orchid varieties, which usually have seeds the size of dust that can easily be picked up by the wind, it may be harder for this orchid to take root elsewhere. *Cyrtosia* seeds need to be eaten and then spread, and also land in an area with the perfect environmental conditions and fungi to survive.

A cross-section of the Cyrtosia fruit shows large seeds, much larger than most orchid seeds that can spread like dust.



Longwood Gardens/Duane Erdmann

If there is any chance that it could spread and displace any native plants, it will be destroyed, he said.

Of the tens of thousands of orchid varieties, many of which steal “oohs” and “ahhs” from visitors weaving their way through the gardens’ warm, perfectly plucked greenhouses, the *Cyrtosia septentrionalis* would stand out—if it had ever been displayed there.

The deep red, tubular-looking fruit of a flower that has no leaves stood out on the outskirts of the gardens’ experimental greenhouses this summer, catching the eye of David Sleasman, the gardens’ director of library and information services, while he was on a lunchtime stroll in July.

“I grew up in the woods of Pennsylvania and never saw anything remotely similar,” Sleasman said. “I noticed a flash of red in the shade several feet into the woods that drew me to walk toward it. That is an unusually bright color for that time of year—too early for leaves.”

And because some orchids can go dormant for years or decades, that may be why it has been overlooked for so long.



Wikidata.com

Sleasman found the orchid in fruit, not flower, when it would look more like a peach-colored orchid with yellowish features. No one has yet seen Longwood’s *Cyrtosia* at that stage, Zale said.

This orchid species is what experts call a “myco-heterotrophic orchid,” a small subset of orchids that obtain their food from fungi. Some rely partially on fungi in varying stages of development; the *Cyrtosia* orchid has no leaves because it gets all of its nutritional needs from fungi, Zale said.

“It’s critical to its life,” he said. “That’s part of what makes this find so remarkable. Not only that the seeds came here, but that it also found the fungus it needs. It’s a really unique and specialized relationship, which is why it has been impossible for people to cultivate.

Now that it has been discovered thriving in the wild, the horticultural detective work can begin.

Based on Longwood’s ordering records, Zale said it’s possible the plant arrived in the late 1970s or early 1980s, hitchhiking on other plants coming from Japan.

Under the absolute perfect conditions, it is possible that tag-along seed was washed out of the research greenhouses and met the perfect kind of fungi to survive, the beginning of a decades-long secret relationship in the woods.

But for now, it’s still a mystery.

PRINCE PHILIP WINS BATTLE TO GROW UK’S FIRST “BLACK DIAMONDS”

Andrew Young

Msn.com., Dec. 2018

via *The Spore Print*, L.A. Myco. Soc., Jan. 2019

For Prince Philip, it must have seemed a near-impossible dream. But after years of patience and perseverance, his truffle farm on the Queen’s estate at Sandringham is finally bearing fungus.

And not just any old fungus, but the rare black truffles [*Tuber melanosporum*] so prized by gourmets that they are nicknamed “black diamonds” and are valued at nearly £1,000 per pound.



French black truffle, *Tuber melanosporum*.

The Duke of Edinburgh, 97, who inspected his one-acre “truffière” orchard just before Christmas, is thought to be the first person in Britain to successfully grow the delicacies.

[While truffles have been twice previously claimed to have been found in Britain since 2015, Prince Phillip’s grove is believed to be

the first to produce a sizable quantity and the first harvested in a climate as far north as Britain of any size.]

Since 2006, when he bought £5,000 of truffle-impregnated trees, reports have suggested he was engaged in a fruitless exercise.

France is the world’s biggest producer of truffles. The fungus grows around roots of beech, oak, and hazel trees and favors alkaline soil, which is prevalent at Sandringham in Norfolk. Truffles can be as small as a penny or as large as a golf ball.



John Fielding

Aerial view of Sandringham House including orchard.

The Duke drafted trained dogs and Italian experts in 2010 to find truffles around his trees, but nothing emerged. It was later claimed it would be 2021 before he was likely to achieve a crop.

However, Adrian Cole, a director of Truffle UK, which supplied the trees, revealed that the Duke has defied expectations. “They have been highly successful,” he said. “The majority have been the French Périgord black truffle—as good as you can get.” The Duke planted more than 300 £15 saplings impregnated with truffle spores in the Royal Fruit Farm where he cultivates apples, gooseberries, and blackcurrants.

The idea was to grow truffles to be used in the Royal kitchens or sold at the farm shop with profits ploughed back into the estate. Cole said: ‘From what I gather, none have been sold. They have gone to the house or family.’

He added that he believed Sandringham was the first place to successfully harvest black truffles in the UK, but was unable to comment on the size of the crop.

“You will never get that information out of a truffle plantation owner. They are very secretive about it,” he said.



BAR-ILAN UNIV. DEVELOPS HYBRID BASIL SPECIES RESISTANT TO EPIDEMIC DISEASE

Zachary Keyser

The Jerusalem Post, Jan. 19, 2019

A hybrid of basil highly resistant to downy mildew has been developed by researchers at Bar-Ilan University, headed by Israeli Prize-winning scientist Professor Yigal Cohen and Dr. Yariv Ben-Na'im. The new species of basil, containing no pesticides, has the opportunity to diminish concerns of farmers worldwide.



Downy mildew resistant basil.

Downy mildew stems from a fungus-like pathogen, called *Pernospora belbahrii*, that causes severe damage to sweet basil crops across the globe. It was first discovered in Switzerland 16 years ago and spread from there to all corners of the Earth, eventually landing in Israel in 2011.

“Israel is one of the major winter exporters of fresh herbs to Europe, Russia, and the eastern United States. The Israeli fresh herb market is estimated to export nearly 70 million euros per year, 50% of which is based on sweet basil. Most of the basil in Israel is grown in the country’s hottest regions—the Arava, Jordan Valley, Beit Shean Valley, and the Negev,” Bar-Ilan University said in a recent statement.

To combat this threat farmers turned to using pesticides to prevent downy mildew from spreading throughout their crops, although this particular disease showed to be unaffected by many of the pesticides available for farmers to use. However, with the new hybrid discovery farmers will be able to eradicate the pathogen from affecting their basil crops, diminishing the epidemic facing Israeli basil farmers today.

The research was performed in conjunction with Genesis Seeds, a research company based in Israel specializing in the production of seeds for various vegetables, herbs, and flowers.

“New funding by Genesis facilitated concentrated efforts towards a new protocol to obtain interspecific hybrids. Bar-Ilan researchers, together with Dr. Isaac Nir and Dr. Arnon Brand from ‘Genesis,’ succeeded in producing a few hybrid plants that are both DM resistant and fertile.”

The new species with the potential to improve the agricultural world was dubbed “Prospera” by the university, the name being a hybrid of the disease *Pernospora* and prosperity.

There are an estimated 391,000 species of Plantae worldwide. Although basil represents a fraction of that number, the discovery, the research, and the methods have the potential assist phytopathologists across the globe in their research of combating other diseases affecting the agricultural world.

“Bar-Ilan Research and Development is proud to utilize the extensive knowledge and experience of Prof. Cohen, a world-renowned expert on phytopathology at Bar-Ilan University and recipient of the Israel Prize for Agricultural Research, in order to improve agriculture in Israel and around the world,” the statement concluded.

RETREATING ARCTIC GLACIER LEADS TO THE DISCOVERY OF TWO NEW SPECIES OF FUNGI THAT CAN GROW IN FROZEN LANDSCAPE

Aristos Georgiou

Newsweek, Jan.16, 2019

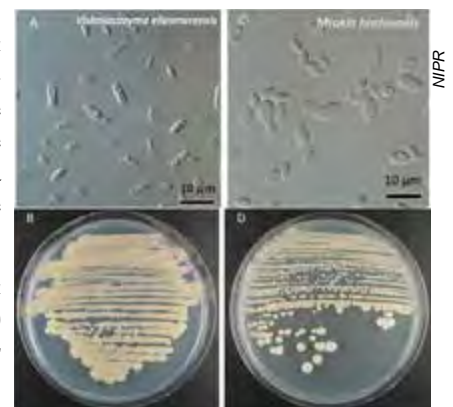
An international team of researchers has discovered two species of fungi entirely new to science in sediments at the front of a rapidly melting glacier on Ellesmere Island, located in Canada’s far north.

The two species are both specially adapted to grow in the extreme cold of their environment, where temperatures regularly hover below freezing and there is a distinct lack of vitamins. That’s according to two related papers published in the *International Journal of Systematic and Evolutionary Microbiology*.

The researchers from Laval University, Canada, Japan’s National Institute of Polar Research (NIPR), and The Graduate University for Advanced Studies, Tokyo, named one of the fungi *Mrakia hoshinonis* after Japanese scientist Tamotsu Hoshino, who has made significant contributions to our knowledge of fungi in the polar regions.

The second species was named *Vishniacozyma ellesmerensis* in reference to the island where it was discovered—the third largest in Canada and tenth largest in the world.

Vishniacozyma ellesmerensis (left) and *Mrakia hoshinonis* (right).



cont. on page 8

Two New Glacier Species, cont. from page 7

“The knowledge of fungi inhabiting the Arctic is still fragmentary. We set out to survey the fungal diversity in the Canadian High Arctic,” Masaharu Tsuji, first author of both papers and a researcher at NIPR, said in a statement. “We found two new fungal species in the same investigation on Ellesmere Island.”

Like in many regions around the globe, the Walker Glacier is retreating at a worrying rate. In fact, the scientists said that in 2016—when the fungi were collected—the glacier was melting two-and-a-half times faster than the average rate over the past half a century.

“Climate-related effects have been observed in this region over the last 20 years,” Tsuji said. “Soon, some of the glaciers may completely melt and disappear.”

It has been estimated that there could be anywhere between 2.2 and 3.8 million species of fungi on Earth, according to a 2017 study published in the journal *The Fungal Kingdom*. However, only a small percentage of these are known to science.

Despite our relative ignorance, we do know that fungi play an incredibly important role in all manner of ecosystems due to their essential role as decomposers which recycle nutrients. Thus, if glaciers melt, fungi such as the newly discovered species may find their habitats irreversibly changed. And this could have disastrous consequences for the ecosystems that rely on them, according to the researchers.

In the future, the team says that they plan to conduct further research in the polar regions to survey the state of fungal life in different areas.

“Eventually, we plan to compile all of our studies to provide an overview of terrestrial ecosystems in the Arctic and Antarctic



Walker Glacier on the northern coast of Ellesmere Island in the Canadian High Arctic.

SURVIVORS' BANQUET

Marian Maxwell

This year's Survivor's Banquet will be March 9 at CUH. The theme will be “Celebrating Mushrooms in Asian Cuisine.” An email with more information and an invitation to register for the banquet will be sent to members on the PSMS email list on February 13.

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