SPORE PRINTS

BULLETIN OF THE PUGET SOUND MYCOLOGICAL SOCIETY
Number 538 January 2018

SANTA CRUZ MYCOFLORA FORAY REPORT

Shannon Adams

The California mushroom season occurs after the PNW mushroom season winds down, so several PSMS members headed to Scotts Valley, CA, near Santa Cruz to attend the second annual Santa Cruz Mycoflora Foray, December 7–10, 2017. The foray, coordinated by Noah Siegel and Christian Schwarz, supports one of the early North American Mycoflora projects of which the PSMS Bridle Trails study is part. The goal of the foray is to get more folks into the forest, to voucher collections, add records to the species list, and expand our data on North American mushrooms.

S. Adams

Noah Siegel and Danny Miller, on the trail.

The conditions were dry in California, but everyone was surprised how many mushrooms were collected. Some species were familiar to us from the PNW, but there were many California species which we did not recognize. We were impressed at flamboyant mushrooms such as the Coccora *(Amanita calyptroderma)*, California Satan's Bolete *(Rubroboletus eastwoodiae)*, and the abundant Midnight Entoloma (*Entoloma medianox*). There were also many interesting collections that were small, unusual, or do not yet have North American species names. I was particularly excited by several *Cortinarius* in the *C. glaucopus* group and the large, oak-associated Phlegmacium subgenus, which rarely occur in the PNW.

S. Adams

Amanita calyptroderma, the Coccora.

S. Adams

California Cortinarius.

The foray was not all about taxonomy. A local chef, Chad Hyatt, gave a cooking demonstration and tasting with advice for preparing and using mushrooms in new ways. At this session and later in the evening, we tasted several species—including sautéed *Entoloma medianox*, Shaggy Mane ("Squid ink") risotto, and Black Trumpet relish. I suspect we may also have eaten some less well-known edibles in the Russulaceae while Danny was in the kitchen! We all survived for another year!

After daily forays we enjoyed speakers such as Danny Miller, our PSMS education lead and *Russula* expert. Danny was most excited by collections of a dark greenish-black capped *Russula*, and had the opportunity to nibble on many caps. Milton Tam's mushroom cultivation workshop was well attended, and he received a loud round of applause when thanks were given. Dr. Steve Trudell was also on staff as a foray mycologist and shared insights on photography techniques during a workshop with Noah Siegel. The keynote speaker was Dr. Tom Volk, who is a professional mycologist and has been a longtime facilitator of Citizen Science. He shared insights into the role water plays in mycology—showing an amazing video displaying the volume of spore dispersal and how it is triggered. We also enjoyed hearing about new *Bolete* genera from Noah and about Citizen Science from Christian.

S. Trudell

Milton Tam oversees the popular grow-your-own oyster kit workshop.

Forays like the SCMF are a great way for club members to extend the mushroom season and learn new species and habitats (and cooking techniques). There will be several long-distance mushroom foray opportunities in 2018—from Oregon to the East Coast. Keep your eye on *Spore Prints* for updates, as they often sell out months in advance!

S. Trudell

Christian Schwarz flanks the Russula table during the Sunday morning table review.

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"If you step on a purple mushroom, you'll be forced to marry the ugliest person in the world," warned the old gnome, so the man continued carefully through the woods. He didn't step on any purple mushrooms. Suddenly a beautiful woman walked up and said: "We have to marry." "Why?" asked the man. "I just stepped on one of those pesky purple mushrooms!" she replied.

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CALENDAR

Jan. 9 Membership meeting, 7:30 pm, CUH
Jan. 15 Board meeting, 7:30 pm, CUH board room
Jan. 23 *Spore Prints* deadline

BOARD NEWS

Luise Asif

The Election Committee is searching for candidates to run for five trustee positions and two officer positions. Per PSMS bylaws, at least one member on the Election Committee needs to be from the membership. Please contact Kim (president@psms.org), Marian (pastpsmspres@yahoo.com), or Luise (fasif@hotmail.com) if you are willing to serve on the Election Committee. Interested in being on the board? Please contact us as well. The board is also discussing separating the general meeting from the Survivor's Banquet to encourage greater attendance of the membership at the general meeting. Kim Traverse's dream of forming a Volunteer Guild is closer to reality with Chiara and Rob DeNeve volunteering to help organize. A board retreat is being considered for the beginning of next year.

MEMBERSHIP MEETING

Tuesday, January 9, 2018, at 7:30 pm at the Center for Urban Horticulture, 3501 NE 41st Street, Seattle

Greg Hovander

Our program to start the year is a "Central Cascades Romp Through Mushrooms." This stunning photographic presentation by mycologist, mountaineer, and naturalist Greg Hovander will showcase the diversity of wild mushrooms gracing the most pulchritudinous plethora of peaks in the Central Cascades between Snoqualmie and Stevens Pass, Washington. He will emphasize edible species and attempt to sharpen identification skills for the astute forager. You will accompany him through strenuous wilderness few people have ever been, up and down mountains east of the Cascade crest in a circuitous route to properly capture the essence of one of the most beautiful real estates on Earth with its myriad mushrooms, plants, and wildlife used to sustain him in his endeavor. If the audience looks trustworthy, he will share some of his concocted recipes for wilderness "thrival" before publishing them.

Greg Hovander is a native of Washington, living in Sultan, WA, with his wife, working as the owner/pharmacist of a small, independent pharmacy, Sultan Pharmacy & Natural Care, where he cares for patients in old-fashioned ways, including the identification of wild mushrooms and plants, use of natural products, and preparation of prescriptions. At age 70, he remains active climbing mountains, studying the wonders of nature, and sharing his enthusiasm for life with now countless audiences. Greg began his lifelong pursuit of mushrooms at the UW School of Pharmacy when offered a research job with radioisotopes for elucidating metabolic pathways utilized by certain mushrooms in producing mind-altering substances. He was founder of the Skykomish Valley Mycological Society and currently is a member of the Snohomish County Mycological Society and the Pacific Northwest Key Council.

CALIFORNIA CASES OF VALLEY FEVER INCREASE IN 2017

Soumya Karlamangla

Los Angeles Times, Nov. 14, 2017

State health officials announced earlier that 2016 broke the record for the most valley fever cases reported since the state started keeping count in 1995. Now, 2017 is on pace to have even more infections. From January through October, 5,121 cases were reported to the state health department, compared with 3,827 cases during the same period in 2016.

People contract valley fever by breathing in dust that contains spores of *Coccidioides immitis* or *C. posadasii*, fungi that are common in semiarid regions of the country. So although anyone can get valley fever, people who work in fields or construction sites where soil gets kicked up are particularly at risk.

Health officials said they didn't know why cases were increasing. Experts have said the rise in valley fever—which has increased nationwide in recent years—could be linked to climate change or droughts because hotter and drier weather leads to more dust in the air.

STALKERS IN CHERNOBYL: RADIOACTIVE EXCLUSION ZONE PLAGUED BY THRILL-SEEKERS & LOOTERS

https://www.rt.com/news/, Dec. 2, 2017

The site of the biggest-ever nuclear disaster would seem like a place to avoid at all costs. But Ukrainian police regularly report catching people sneaking inside the Chernobyl exclusion zone. Some do it for thrills; others want to make some quick cash.

While most of the trespassers come to Chernobyl for the thrill, other visits have a more practical purpose. Occasionally Ukrainian police report catching somebody trying to smuggle scrap metal, which can be later sold for recycling. A man carrying about 200 kg of rusty metal in his motorcycle sidecar was caught last week. In September, a man tried to carry out 15 kg of lead pellets from Chernobyl, but was busted at a checkpoint. Metal hunters are typically unconcerned that their loot may be radioactive.

Arguably an even more irresponsible way to make money on Chernobyl is picking mushrooms and wild berries in the exclusion zone, where competition for the foodstuffs is virtually non-existent. In September, the police reported intercepting two villagers leaving the restricted area carrying 40 kg of mushrooms, which they claimed were for their personal consumption. The report said Geiger meters proved that this was not the best idea: the mushroom radiation levels were some 30 times higher than what is considered safe.

Radioactive Chernobyl mushrooms.

FRANCE FINDS TRACES OF RADIATION FROM CHERNOBYL IN MUSHROOMS FROM BELARUS

Paul Pradier

ABC News, Nov. 30, 2017

A shipment of imported Belorussian mushrooms contaminated with radioactivity was blocked from entering France this week, French authorities said.

Authorities said there was no connection with the cloud of atmospheric radioactive contamination containing ruthenium 106 emanating from Russia that has been detected over Europe, as previously thought. Instead radiation from the Chernobyl nuclear accident is now believed to be the cause of the contamination, according to French authorities.

The French Consumer Protection Agency told ABC News on Thursday the contaminated mushrooms "… did not represent a health threat to consumers but contained higher level of Cesium 137 than the regulatory limit and were therefore destroyed."

"Cesium 137 is still frequently found in the Chernobyl area," a spokesperson for the French Consumer Protection Agency said. "And it has a 30-year half-life" he added.

The city of Chernobyl, the site of a catastrophic nuclear accident 30 years ago, is located a few miles south of the Belarus border.

CYCLOSPORINE: MODERN HEART TRANSPLANTS OWE THEIR ORIGINS TO A FUNGUS FOUND IN THE DIRT

Katherine Ellen Foley

Quartz Media LLC (US), Dec. 3, 2017

Fifty years ago today (Dec. 3), Denise Darvall, a South African woman in her mid-20s, died in a car crash. Her death was tragic, but had a silver lining: it catalyzed one of the most important medical breakthroughs in modern history.

Christiaan Barnard, the senior cardiothoracic surgeon at the Groote Schuur Hospital in Cape Town, had for years been practicing heart transplants on dogs. When Darvall came into the hospital, Barnard had a patient, Louis Washkansky, who was dying of diabetes and heart failure.

When the doctors who tried to save Darvall's life noticed, after her death, that her heart was otherwise healthy, and that she had the same blood type as Washkansky, Barnard jumped into action. Within a span of five hours, he made history as he completed the first successful human heart transplant.

"On Saturday, I was a surgeon in South Africa, very little known. On Monday, I was world renowned," he said, according to PBS.

Surgeons around the world were hopeful the development would soon lead to thousands of lives saved. But their patients kept dying; even after successful surgeries, their bodies wouldn't accept their new organs. Although there were drugs that could suppress the immune system, they were so potent that transplant recipients couldn't fight off any infections. Washkansky himself died from pneumonia just 18 days after receiving his new heart. After all these failures, the number of heart transplant surgeries plummeted from 100 in 1968 to just 18 in 1970.

Two years after the first heart transplant and about 9,400 miles (15,000 km) away from South Africa, the Swiss microbiologist Jean-Francois Borel was taking a vacation in Norway. His employer, a biomedical company called Sandoz Laboratories (now owned by the pharma giant Novartis), encouraged employees to take soil samples when they traveled, in the hopes that one day they'd stumble across a potential new drug.

Borel's Norwegian soil sample turned out to hold the key to the heart-transplant problem. Back at the lab, he discovered that the soil contained bits of a naturally occurring mold called *Tolypocladium inflatum.* The species, it turned out, is an asexual form of a known fungus called *Cordyceps subsessilis.* In its sexual state, *C. subsessilis* is a parasite that takes over the muscles of scarab beetles, and doesn't have much value for human health. In its asexual state, however, *T. inflatum* produces a group of compounds called cyclopeptides that Borel discovered, through tests on lab mice, seemed to suppress the exact immune cells involved in organ-transplantation rejection.

From there, Borel's fungal discovery had to clear a couple more research hurdles before its approval. After four years working to turn the compounds into useful human drugs, in 1973 Sandoz almost abandoned researching the compound after the company estimated it would have needed another $250 million to put the

cont. on page 4

Cyclosporine, *cont. from page 3*

drug through the clinical trials mandated by the FDA (over $1.3 billion in 2017 dollars). At the time, the market for immunosuppressant drugs for transplant patients was tiny. Transplants then were unpopular, due to their poor long-term results… because the field lacked effective immunosuppressants.

Luckily, scientists at the British Society of Immunologists convinced Sandoz that these peptides could potentially treat common types of inflammatory diseases like rheumatoid arthritis, which made them a better bet to make back the anticipated costs of research and development. In 1983, the US Food and Drug Administration approved cyclosporine under the brand name Sandimmune.

"Cyclosporine was revolutionary," says Howard Eisen, a cardiologist surgeon at Drexel University College of Medicine. It works by limiting only the immune cells that would attack the new organ, leaving the rest of the immune systems intact. It also keeps chronic inflammation at bay. With cyclosporine, transplant patients actually had a shot to live with their new hearts. Shortly after the drug's approval, transplants skyrocketed, and as of June 30, 2016, there had been over 135,000 successful heart transplants, according to the International Society for Heart and Lung Transplantation.

The drug was never perfect: in the doses originally prescribed, cyclosporine severely damaged kidneys and was found to be a potential carcinogen, Ellis says. Today, all transplant recipients are given a combination of three separate immunosuppressant drugs, including a lower dose of cyclosporine, to mitigate these side effects. That said, the development of cyclosporine was a game-changer. Without its discovery, additional advances in the field of heart transplantation would likely have been slower or never even happened. Though its origins are humble, the drug's impact has been extraordinary

HYDROCARBON-DEGRADING FUNGUS YIELDS ITS SECRETS

https://phys.org/, Nov. 29, 2017

Thanks to genes acquired from bacteria, a fungus can degrade an environmentally harmful hydrocarbon—and comes under considerable stress in the process. These remarkable research findings, which were published recently, were obtained by a group from the University of Natural Resources and Life Sciences, Vienna (BOKU). The results were made possible thanks to the very latest equipment for genome and transcriptome analysis, the use of which is also open to third parties at BOKU.

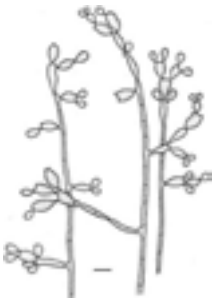
Cladophialophora immunda may be a fungus but it is no mere mushroom! This ascomycete or sac fungus, which belongs to the group of yeast fungi, has one very impressive characteristic: it can easily decompose the environmentally harmful hydrocarbon toluene. This makes *C. immunda* an excellent tool for the biological remediation of soil and other environments polluted with hydrocarbons. Using the very latest sequencing methods and a specially developed bioinformatic pipeline, Dr. Barbara Blasi and Dr. Hakim Tafer from Prof. Katja Sterflinger's team at the Department of Biotechnology (BOKU, Vienna) examined, for the first time, precisely how the fungus does this. The surprising results of the study, which were recently published in the journal *Scientific Reports*, reveal that *C. immunda* acquired numerous genes essential for toluene degradation from bacteria and, moreover, that toluene degradation goes hand in hand with enormous stress, to which the fungus responds with numerous reactions.

Fast and Reliable Sequencing

The astonishing findings were also made possible thanks to the very latest sequencers, which are available at the university's EQ-BOKU core facility and can also be leased to third parties. They include an ion semiconductor sequencer (Proton Ion Sequencer), which enables the extremely rapid sequencing of large volumes of nucleic acids. This made it possible for the BOKU research team to obtain, among other things, valuable information about the activation of genes during toluene degradation. Prof. Sterflinger explains: "In this way, we produced the world's first transcriptome analysis of a fungus that grows on toluene. We were also able to show that *C. immunda* has almost all of the enzymes that were previously associated—from different organisms—with toluene degradation." The scientists even succeeded in demonstrating that the genes for these enzymes are grouped in five clusters on the DNA. Such gene clusters are not unusual in fungi, but this phenomenon had not previously been described for the genes that play an important role in hydrocarbon degradation. A comparison of the comprehensive sequence data from *C. immunda* with those of other organisms also demonstrated clearly that eight genes for toluene degradation were transferred from bacteria to the fungus in the past.

Mushrooming Stress

When the team examined the activity of other genes whose expression was influenced by the toluene degradation, another surprise awaited them. "Despite its ability to degrade toluene very efficiently, the process creates enormous stress for *C. immunda*. An entire series of cellular metabolic processes are negatively affected by the contact with toluene," explains Prof. Sterflinger. These processes include basic cell functions like the production and degradation of amino acids and organic substances, cell respiration, and special transport mechanisms. The scientists were also able to demonstrate that toluene degradation triggers the production of antioxidants and activates cell detoxification mechanisms. All of these processes are unmistakable indicators of stress. "This suggests that, even though it can degrade toluene so effectively, toluene is no true friend of *C. immunda*," explains Prof. Sterflinger. "On the contrary, the effective destruction of the toluene appears to be a protective mechanism used by the fungus to shield it from its harmful effects."



Microscopic morphology of C. immunda. Scale bar = 10 µm

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Over 90% of all elm trees in Britain died in the span of only a few decades, owing to one invasive fungus from China. This fungus, Ophiostoma spp., causes Dutch elm disease, which blocks the xylem from moving nutrients up the elm, killing it. In place of elms, trees which are more familiar to us—such as oaks—have grown, and your average British countryman would likely be unable to point out his nearest elm.

GLOBAL FUNGUS TIED TO CONTINENTAL DRIFT

https://medicalxpress.com/, June 15, 2017

Cryptococcus, a genus of fungi found worldwide that is responsible annually for upwards of 625,000 deaths, was likely originally spread across the globe in conjunction with continental drift, according to a report by the Translational Genomics Research Institute (TGen).

Cryptococcus—Greek for "hidden sphere"—is a fungus usually found in decaying trees and soils. It grows in cultures as yeast. Two primary species of Cryptococcus—*Cryptococcus neoformans* (*C. neoformans*) and *Cryptococcus gattii* (*C. gattii*)—can cause severe illness, including meningitis, and death.

In a letter published today in the journal *mSphere*, TGen researchers advance a growing hypothesis that currently separated populations of *Cryptococcus* fungi were once connected as part of the super-continent known as Pangea. The separation of the populations likely occurred millions of years ago through continental drift, rather than through other methods of dispersal like wind or from human causes.

For example, the subtype of *C. gattii* called "VGI" is commonly found in southwestern Europe's Iberian Peninsula (Spain and Portugal) and in sub-Saharan Africa. Now separated by the Mediterranean Sea, Spain was the only European connection to Africa in Pangea.

Likewise, a subtype in India matches those in southern Africa. India and southern Africa were once joined in Pangea. Also in Africa, the subtype of *C. gattii* called "VGII" is found only in Senegal. This subtype was recently shown by TGen researchers and others to originate from Brazil. Now separated by the Atlantic Ocean, Senegal and Brazil were once joined in Pangea.

DEADLY CRYPTOCOCCAL FUNGI FOUND IN PUBLIC SPACES IN SOUTH AFRICA

https://medicalxpress.com, Dec. 6, 2017

Large populations of potentially deadly cryptococcal fungi have been found on woody debris collected from old trees in two public areas in the center of Cape Town and the Northern Cape, South Africa. *Cryptococcus neoformans* causes a severe form of meningitis, mostly in individuals with a compromised immune system. Generally, healthy people's immune systems are able to ward off the infection. *Cryptococcus gattii*, on the other hand, can lead to meningitis in healthy individuals. People become infected when they inhale the airborne microscopic spores produced by pathogenic cryptococci occurring in the environment.

After tuberculosis, cryptococcal meningitis is the leading cause of death in HIV/AIDS patients in Sub-Saharan Africa. In 2016, South Africa launched the world's largest national screening program to detect cryptococcal meningitis in patients living with HIV.

This is the first time that both *Cryptococcus neoformans* and *Cryptococcus gattii* have been found in such large numbers on trees in South Africa. The fungi were found and identified by PhD student Jo-Marie Vreulink as part of her research in the Department of Microbiology at Stellenbosch University. The findings of her research have now been published in the journal *Fungal Ecology*.

COMMON FUNGUS HELPS DENGUE VIRUS THRIVE IN MOSQUITOES

https://www.sciencedaily.com/, Dec. 7, 2017

A species of fungus that lives in the gut of some *Aedes aegypti* mosquitoes increases the ability of dengue virus to survive in the insects, according to a study from researchers at Johns Hopkins Bloomberg School of Public Health. The fungus exerts this effect by reducing the production and activity of digestive enzymes in the mosquitoes.

The discovery, reported this week in *eLife*, illuminates a biological mechanism that could turn out to be a general indicator and modifier of dengue transmission risk in the wild.

"If this common fungus proves to have a significant impact on mosquitoes' ability to transmit dengue virus to people in endemic areas, then we can start to think about ways to translate this knowledge into specific anti-dengue strategies," says George Dimopoulos, PhD, professor in the Bloomberg School's Department of Molecular Microbiology and Immunology.

Scientists have estimated that hundreds of millions of people suffer dengue virus infections—known as "dengue fever"—in tropical regions each year. Dengue infections can involve severe joint and muscle pain and have also been termed "breakbone fever." Although most cases are mild enough that they are never clinically reported, some take a severe hemorrhagic form that requires hospitalization and is often fatal.

Dimopoulos and colleagues have discovered certain bacterial species that can live in mosquitoes and affect the insects' ability to transmit dengue and other diseases. In a recent field project in Puerto Rico, as they reported last year, they also discovered a fungus that lives in the gut of *Anopheles* mosquitoes and affects the insects' susceptibility to malaria parasites. In the new study, which stemmed from the same field project, Dimopoulos's team isolated a different type of fungus, from a genus called *Talaromyces*, from the gut of dengue-carrying *Aedes aegypti* mosquitoes.

The scientists fed spores of the fungus to *Aedes* mosquitoes via a sugar solution prior to a blood meal laced with dengue virus, and found that mosquitoes harboring the fungus were more likely to become infected by the virus. The dengue-infected mosquitoes that harbored the fungus also tended to have more dengue virus particles in their gut—meaning that the virus could survive and make copies of itself more easily when the fungus was present.

The researchers then showed that this dengue-enabling effect was due to molecules that are secreted by fungal cells and reduce the activity of mosquitoes' digestive enzymes. The process blocks the activity of genes that encode these enzymes, and also directly inhibits the protein-breaking biochemical activity of some of the enzymes.

"This finding tells us that the protein-digesting activity of the mosquito gut can influence the success of dengue virus in establishing infection in the mosquito," Dimopoulos says. "The virus has a protective envelope called a capsid that is protein-based, so it is possible that this capsid is susceptible to some of these mosquito-gut enzymes."

He notes that although many mosquito species feed on human blood, most are not infected by or don't transmit dengue virus—for

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Dengue Virus, *cont. from page 5*

reasons that researchers have never fully understood. "It is possible that some of these incompatibilities between mosquitoes and dengue virus relate to this enzyme activity in the mosquito gut that can be modulated by fungi and other microbes," Dimopoulos says.

Talaromyces fungi are common, he adds, and are likely to be found in *Aedes* mosquitoes not just in Puerto Rico but globally, although further field studies are needed to demonstrate their influence over dengue transmission to human populations.

If the fungus does have a significant real-world impact, then in principle the presence or absence of the fungus in mosquitoes could be used as a simple marker of local transmission risk. "One also can imagine, for example, anti-fungal solutions being added to the breeding water or to artificial feeding stations to reduce local dengue transmissibility," Dimopoulos says.

"An *Aedes aegypti*-associated fungus increases susceptibility to dengue virus by modulating gut trypsin activity" was written by Yesseinia Angleró-Rodríguez, Octavio Talyuli, Benjamin Blumberg, Seokyoung Kang, Celia Demby, Alicia Shields, Jenny Carlson, Natapong Jupatanakul, and George Dimopoulos.

DUTCH DESIGNERS CONVERT ALGAE INTO BIOPLASTIC FOR 3D PRINTING

Ali Morris

https://www.dezeen.com/, Dec. 4, 2017

Dutch designers Eric Klarenbeek and Maartje Dros have developed a bioplastic made from algae which they believe could completely replace synthetic plastics over time.

Klarenbeek and Dros cultivate algae—aquatic plants—which they then dry and process into a material that can be used to 3D print objects.

Antoine Raab

Preparing alga used in 3D printer.

The designers believe that the algae polymer could be used to make everything from shampoo bottles to tableware or rubbish bins, eventually entirely replacing plastics made from fossil fuels like oil.

They are among a host of designers using algae and fungi to create products that are more environmentally friendly than their synthetic counterparts, from fabric dyes and water bottles to chairs and even entire building facades.

As well as algae, Klarenbeek and Dros have created biopolymers from other organic raw materials such as fungal mycelium, potato starch, and cocoa bean shells, which they use to 3D print objects.

The studio's ultimate goal is to establish a local network of biopolymer 3D printers, called the 3D Bakery.

"Our idea is that in the future there will be a shop on every street corner where you can 'bake' organic raw materials, just like fresh bread," said Klarenbeek.

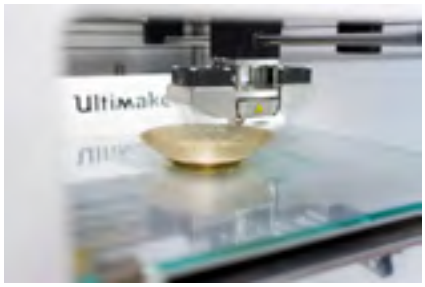
"You won't have to go to remote industrial estates to buy furniture and products from multinational chains. 3D printing will be the new craft and decentralized economy."

Both Design Academy Eindhoven graduates, Klarenbeek and Dros' research follows on from Klarenbeek's work with mycelium, which began six years ago and led to him developing the world's first 3D-printed chair using a living fungus.

Since then, together with American company Ecovative, the studio has developed a commercial line of mycelium products called Krown. The DIY kits allow consumers to grow their own lamps, tables, or biodegradable picnic items.

Florent Gardin

3D printers in action.



Antoine Raab

The designers believe their project offers a solution to the vast consumption of non-renewable fossil fuels, which emit carbon dioxide (CO_2) into the atmosphere when burnt to create materials like plastic. Scientists attribute rising CO_2 levels to global warming.

"All around the world in recent decades, enormous amounts of fossil fuels—materials that lay buried in the ground for millions of years—have been extracted," said the designers.

"In this relatively brief period, a vast amount of carbon dioxide has been released into the atmosphere, with damaging consequences. It is therefore important that we clean the CO_2 from the atmosphere as quickly as possible and this can be done by binding the carbon to biomass."

As a type of plant, algae absorbs carbon dioxide during the process known as photosynthesis, which it uses to create energy. Therefore, the designers are advocating the growth of algae to be used as a production material to help reduce global CO_2 levels and prevent climate change.

"Everything that surrounds us—our products, houses, and cars—can be a form of CO_2 binding," they said. "If we think in these terms, makers can bring about a revolution. It's about thinking beyond the carbon footprint: instead of zero emissions we need 'negative' emissions."

After three years of research into algae with Wageningen University, Salga Seaweeds, Avans Biobased Lab in Breda and other institutions, Klarenbeek and Dros were invited to establish an open research and algae production lab at the Luma Foundation in Arles.

Antoine Raab

Examples of 3D printed objects.

"Alga is equally interesting for making biomass because it can quickly filter CO_2 from the sea and the atmosphere," said the duo.

"The algae grow by absorbing the carbon and producing a starch that can be used as a raw material for bioplastics or binding agents. The waste product is oxygen, clean air."

Since February 2017, the pair has been splitting their time between their home and studio in a former paint factory on the River Zaan in Zaandam, the Netherlands, and the AlgaeLab at atelier LUMA in Arles, France.

In the lab, the duo cultivate the living algae, which they then dry and process into a material that can be used to 3D print objects.

The designers believe that the local algae polymer could be used to make everything from shampoo bottles to tableware or rubbish bins, eventually replacing fossil oil-based plastics entirely.

"Our ambition is to provide all restaurants and catered events in the city with tableware from the AlgaeLab," they said.

"We are currently using our 3D printers to produce the same design in Arles and in Zaandam, one from French algae and the other from Dutch seaweed."

"Both have exactly the same form, but they are made from local materials," the studio continued. "This is the change we believe in: designing products that are distributed via the Internet but made locally."

"We don't want to grow into a large centralized organization," added Klarenbeek, who believes that the 3D Bakery could be a reality within 10 years. "We want to change the system so that people grow raw materials locally that they can use to produce things that comply with their needs."

The duo's research is currently on show at Museum Boijmans Van Beuningen in Rotterdam as part of an exhibition called Change the System, curated by Annemartine van Kesteren.

For the duration of the exhibition, which runs until 14 January 2018, Klarenbeek and Dros are working on a new algae glass made from algae grown in the museum's pond. When enough algae are produced, they will be "harvested" and dried into a 3D printable material, which will then be used to produce a replica of a glass object from the museum's collection.

Van Kesteren presented this project as part of Dezeen's Good Design For A Bad World talks series at Dutch Design Week, which aimed to question whether designers can offer solutions to global issues.

The curator sees Klarenbeek and Dros' work as an important example of how a small project could be scaled up to make a real difference to the world.

"According to Eric, if we dream big we need to find the solutions on a microscale," said Van Kesteren. "Algae are a miracle in his approach."

GROUP PUSHES TO LEGALIZE PSYCHEDELIC MUSHROOMS IN OREGON

Reed Andrews

http://katu.com/, Dec. 4, 2017

BEAVERTON, Ore. - A group is looking for voters to weigh in on whether Oregon would be the first in the nation to legalize psilocybin mushrooms. Psilocybin is the compound found in some types of mushrooms that has a hallucinogenic effect on users.

The Eckherts have been working for more than two years on their legalization effort. They anticipate that Oregonians will get to vote on whether to legalize psilocybin in the 2020 election.

Their measure doesn't call for recreational use to be allowed, instead saying it would be highly regulated, and for people 21 years or older with specific medical needs.

"Supervised sessions, kind of a sequence of sessions including assessment and preparation and then the psychedelic administration session," Tom Eckhert said.

"We envision a very regulated production center that the state keeps track of inventory and things of that nature, so we know that it's not getting out where it shouldn't be getting out to," Cheri Eckhert said.

The measure would have the state create a board that would lay out the rules and regulations within a year of voters approving the legalization.

FIRST-EVER CASE OF HISTOPLASMOSIS DIAGNOSED IN THE MIDDLE EAST

Judy Siegel-Itzkovich

The Jerusalem Post, Dec. 11, 2017

Dubbed "cave disease," histoplasmosis, which is caused by *Histoplasma capsulatum*, a fungus found in soil—usually from bird dropping or bat guano, was discovered for the first time in the Middle East by physicians at Rambam Medical Center, Haifa, Israel.

"A few months ago, we received a biopsy taken from a woman's pharynx in the course of a diagnosis in another hospital," recalled Dr. Ami Neuberger, director of the tropical diseases clinic." She said the woman suffered for months from general weakness, significant weight loss, and a lump in the throat that caused hoarseness and difficulty in speech. "Such lesions are thought here to usually be malignant, but this case was different; I did not believe the result at the beginning," Neuberger said. "Specific tests in the microbiological laboratory confirmed the diagnosis. I immediately asked the patient, who lives in the Galilee region, 'Where did you go?' To my surprise, it turned out that the woman never left the country."

Confused about how their patient contracted the disease, the Rambam researchers thought about the Yodfat cave in the Galilee. In 1977, a cave researcher identified the fungus in a bat at the cave.

cont. on page 8

Histoplasmosis, *cont. from page 7*

Although this report was published, there were no reported human infections, and the disease seemed to exist far away.

"It is very close to the area where the woman lives. We tried to find the fungus in the Yodfat cave and in the patient's neighborhood, but no fungus was found in any of the samples," said Neuberger. "I hope this is the first and last case in Israel."

Neuberger explained that histoplasmosis is not transmitted person to person. After the Rambam doctors started treatment with an anti-fungal drug, the symptoms went away within a few weeks."

FUNGAL MICROSCOPY 101 CLASSES IN 2018

Shannon Adams & Danny Miller

Are you ready to go beyond spore prints into the fascinating world of fungal microscopy? In 2018, we plan to offer several classes and opportunities to develop and hone your microscopy skills to improve mushroom ID.

Why bother? More advanced microscope skills are essential for ID of many species, and the microscope offers views of stunning features and microstructures that help add confidence for ID of any species (plus, there are gorgeous sights to see such as the horned cystidia of *Pluteus cervinus*). With the long winter, we can keep enjoying mushrooms by working on dried collections from our fall collecting!

The initial workshop to be held in January is fully booked, but a new class is scheduled for March 17, 1–4 pm in the CUH Douglas Classroom, Seattle. The class will cost $25 (to help pay for room and supplies) and can accommodate 20 members. Currently, there are 8 people on the wait list so we should have at least 10 additional spaces.

Look out for a registration link which will be sent to the club at large, or email Shannon Adams (moonshell@gmail.com) to express interest.

Classes will start at an introductory level and cover using equipment, basic lab techniques, spore viewing and measurement, key microscopic features, and sources of information that help you use your new powers for better identification of species of interest.

We plan to have microscopes available at club events, so even if the class is full, we are committed to helping you learn more about fungal microscopy in the year ahead.

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