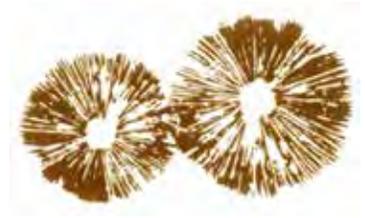


# SPORE PRINTS

BULLETIN OF THE PUGET SOUND MYCOLOGICAL SOCIETY  
Number 531 April 2017



## STAPLES OF NEANDERTHAL DIETS UNLOCKED BY LOOKING AT THE GUNK IN THEIR TEETH

Alan Cooper & Laura Weyrich  
*Ancient Origins*, Mar. 13, 2017

The typical vision of Neanderthals has not been particularly flattering, often featuring a giant club and spear and unfortunate sartorial choices. For years, researchers have worked to overturn this view, albeit with limited evidence.

But new research, published today in *Nature*, provides some of the first nuanced, detailed insights into the everyday lives of Neanderthal.

Sequencing the ancient DNA within preserved dental plaque (calculus) uncovered specific information about Neanderthal diet and health as well as further insights into their interactions, behavior, culture, and knowledge.

Dental calculus preserves ancient DNA from microorganisms, viruses, food, and other biological material that pass through an individual's mouth. This leaves a source of information for DNA scientists to discover thousands of years later.

*Rendering of Neanderthal family cooking and eating. They weren't just carnivores.*



Mauricio Anton/Science

Paleoanthropology Group  
MNCN-CSIC

### The Neanderthal Diet and Lifestyle

We examined two Neanderthals from El Sidron cave, Spain, and a Neanderthal from Spy cave in Belgium. We found drastic differences in their diet that correlated with changes in their microbiomes.

The Spy Neanderthal fit the stereotype of a carnivorous, big game hunter, with DNA from woolly rhinoceros and wild mouflon sheep, as well as native mushrooms still eaten in Europe today.

In stark contrast, the two El Sidron Neanderthals showed no evidence of meat in their diet. They were consuming pine nuts, moss, tree bark, diverse mushrooms, and other (likely moldy) herbaceous material.

These truly were paleo diets, consuming what could be foraged and identified in their local environment. For example, Spy cave in Belgium was on the edge of a steppe-like environment of grassy hills and plains, populated with megafauna such as woolly rhinos. In contrast, the El Sidron Neanderthals lived in a dense mountain forest, where pine nuts and mushrooms would have been a major food source.

### Neanderthal Food as Medicine

The skeleton of one young male Spanish Neanderthal displayed a nasty dental abscess. His dental calculus also contained DNA from a serious gastrointestinal parasite (Microsporidia). As a result, it is likely that he was chronically ill.

Surprisingly, our dietary analysis revealed that this Neanderthal was likely treating his illnesses with natural remedies. He had DNA from poplar (whose buds and bark are a natural source of aspirin) and, surprisingly, the mold *Penicillium*, the source of the world's first antibiotic, penicillin.

While *Penicillium* mold is common in the environment, he had clearly been eating rotting vegetation containing several other molds. We did not see this in the other Neanderthals, raising the question of whether Neanderthals were using antibiotics.

This research suggests that Neanderthals maintained an extensive knowledge of treatments for ailments, and as such significantly changes our view of their culture and behavior.

It also shows how the ancient bacteria on teeth now provide us with a completely new window into the behavior of ancient hominids, and the origin of our own microbiomes.

This is the first time specific species have been identified in the Neanderthal diet, and match previous archaeological studies of this individual.



*Upper jawbone of sick Neanderthal boy from El Sidron cave. DNA analysis of dental calculus deposits on rear molar (right) revealed he was eating poplar, a source of aspirin, and vegetation with mold, including the fungus *Penicillium*.*

### SPRING FIELD TRIP ALERT

Brian S. Luther

I'm still working out the schedule for the spring field trips. New Washington State DNR regulations and US Forest Service warnings that they might have to cancel one of the spring reservations because of washout or flood danger is making it difficult to get everything in order in time for the April *Spore Prints* issue. **PSMS members are going to have to pay close attention to the Members area on the PSMS website for field trip updates, changes, and cancellations.**

For now all I can tell you is that our first spring field trip will be April 29. Also, starting this year, we will require online registration for the long field trip at Eagle Creek over the Memorial Day weekend. It will be free, but only members can register and we're limiting it to a hundred. Members will get the field trip details only after registering.

# Spore Prints

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PUGET SOUND MYCOLOGICAL SOCIETY

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## MEMBERSHIP MEETING

Tuesday, April 11, 2017, at 7:30 pm at the Center for Urban Horticulture, 3501 NE 41st Street, Seattle

Our speaker for April is noted northwest mycologist Dr. Michael Beug, who will enlighten us on the genus *Ramaria* and closely related species. Learn when and where to find the abundant, large, meaty spring *Ramaria*, all of which are edible. Hear why he felt safe in feeding a *Ramaria* species of unknown edibility to over 40 people on a mushroom foray (after telling them the nature and goals of the experiment). See him demonstrate use of the free, online, Pacific Northwest Key Council *Ramaria* key so that, later on, you can identify many of the *Ramaria* species on your own.



Dr. Beug spent 32 years at The Evergreen State College in Olympia, where he taught chemistry, mycology, and organic farming. His award-winning photographs have appeared in roughly 50 books and articles on mushrooms, and he is a coauthor of *Match-Maker*, a free mushroom identification program covering 4,092 taxa. Winner of the 2006 NAMA (North American Mycological Association) Award for Contributions to Amateur Mycology, he currently serves on the NAMA Education Committee and is chair of the Toxicology Committee and the Editorial Committee. He has served four terms as president of the Pacific Northwest Key Council, a group dedicated to writing macroscopic keys for the identification of fungi. He loves to teach beginner workshops and lead forays and remains active as an identifier and speaker at regional mushroom club forays. His specialties are Ascomycetes, the genus *Ramaria*, and all toxic and hallucinogenic mushrooms.

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

## NEW PRODUCT

The Outdoor Deodorant Company announced their new product "Hey Sniff This!" to be released on March 32nd. It is a room deodorant extracted from the mushroom *Phallus impudicus* and is guaranteed to eliminate any odor by replacing it with the fragrance of a woody treasure. A companion product for vegans is called "Durian Delight" and has an aroma of tropical fruit.

## CALENDAR

- April 11 Membership meeting, 7:30 pm, CUH
- April 17 Board meeting, 7:30 pm, CUH Board Room
- April 18 *Spore Prints* deadline
- April 29 Field trip (see PSMS website)

*Fungi emerging*  
*Ephemeral Things*  
*Making us wonder*

## BOARD NEWS

**Luise Asif**

Daniel Winkler led the first Bridle Trails State Park survey on Sunday, March 19. Those attending learned the appropriate procedures for recording and photographing specimens and had a very enjoyable afternoon. Paul Hill is preparing an instruction booklet for future use. Over 15 species were recorded. The next survey will be April 10.

New board members were welcomed at the March board meeting and will take over in April. We appreciate the dedication of members who are leaving and thank them for their hard work. Erin and Brady Raymond will continue with the PSMS Blog, with Erin also continuing as Book Sales Chair. Milt Tam and Jamie Notman are still active in the Cultivation Committee. A thank you is not enough for John Goldman, whose enormous effort as Treasurer has brought us to the financially secure position we are

in currently. We appreciate his attention to detail and dedication to PSMS. Thankfully John has agreed to continue to help with contracts, books, and where needed.

The board has formed a committee—Kim Traverse, Milt Tam, John Goldman, and James (Animal) Nowak—to investigate getting a long-term lease for space that would provide PSMS with classrooms, an office, storage, and most importantly a lab. In the event that we receive notice from the University, we want to be ready with options. We are discussing the creation of a Planned Giving chair after a former member indicated they were intending to have PSMS be a beneficiary in their will.

Kim is working on creating a Wikipedia page for PSMS.

Mushroom Maynia is May 21, and Chair Jamie Notman will be announcing a time for a planning meeting shortly. Based on feedback from last year, lectures will be included.

## PSMS BRIDLE TRAILS FUNGA STUDY UPDATE

Daniel Winkler & Luise Asif

We had our first Bridle Trails study survey this year on March 19 and found over a dozen interesting mushrooms. After two hours in the woods, the cold—and the notion that we had plenty of material to work on—drove us out into the sun, where we held an ID session on park tables close by. We were glad to see how our study's organization has improved thanks to great volunteer support by a range of people. We realize we still have a bunch of loose ends we have to work out, especially management of specimens after collection and data upload, but we are all excited anyway. We have already learned a bunch of new mushrooms and enjoyed being in the woods and sharing our enthusiasm and curiosity among the 15 participants.

We have set the following dates for our Bridle Trails mushroom study until summer. Come rain or shine!

4-10 Monday  
4-23 Sunday  
5-8 Monday  
5-21 Sunday (early morning, ID session at Mushroom Mania)  
6-5 Monday  
6-18 Sunday  
7-3 Monday

We alternate between Sundays and Mondays. Everyone who wants to deepen their mushroom knowledge is welcome.

We'll always meet in the parking lot off 116th Ave NE across NE 53rd St, Kirkland WA. Please note that you need a State Park Pass to park in this parking lot. Meeting time is 1 pm unless otherwise specified, but please check in at least a day or two in advance each time before heading out. For about two hours we'll head into the woods to find, document on our voucher cards, photograph, and then collect the specimens. Afterwards we will work on identification—bring your books, laptop, microscope, etc., and maybe a snack. Each outing we'll make a list of what we collected and will upload our best specimen pictures with voucher numbers and ID. It is not so much about quantity but more about quality of documentation.

For Sundays in general we hope to be able to do ID right afterwards close to the Bridle Trails State Park; we are still looking into options. For Mondays the idea is to do ID sessions right afterwards at CUH as part of the Monday public ID clinic.

**Please RSVP to Luise Asif (fasif@hotmail.com)** if you intend to participate and let us know if you can make it.



*Bridle Trails study group, March 19, 2017.*

## MONDAY ID CLINICS TO OPEN APRIL 24

Brian S. Luther

The spring 2017 Hildegard Hendrickson ID Clinic will begin on Monday, April 24. It will run continuously on Mondays until sometime in June, except for the Memorial Day Holiday on Monday, May 30, when it will be closed. ID Clinic hours will be 4:00 to 7:00 pm. This is a free public service, compliments of the Puget Sound Mycological Society. PSMS members and the public are invited to bring in fungus specimens for identification during these hours. Mushroom experts will be on hand to answer your questions. The ID clinic will be held at the Miller Library atrium at CUH, located at 3501 NE 41st St., just south of University Village on the east campus of the University of Washington

When collecting samples for ID, please be sure to bring the entire fruiting body, which may involve digging it up to get the whole specimen. Be sure to segregate different species (but you can put several samples of the same species together) in individual paper or wax paper bags. Avoid using plastic bags because they don't breathe and the specimens can start decaying. Pay attention to habitat and associated trees (bring in a small sample of trees or write a simple data slip for collections) because this information helps us to identify your specimens.

## SPRING FIELD TRIP HOST ARE ALWAYS NEEDED

Brian S. Luther

Please consider volunteering as a field trip host. I know that all of you have enjoyed the breakfast snacks and hot coffee provided first thing on Saturday mornings at our field trips. Our first field trip is in late April and we can always use your help hosting or co-hosting then, or at any of the May and June field trips coming up. The field trip agenda will be posted on the secure "Members" section on the PSMS website in mid-April. Thank you.

## NO 'SHROOM AT THE INN FOR DUTCH WOMAN IN CADIIZ

John Smith

*EuroWeekly*, Mar. 14, 2017

When a woman in the town of El Puerto de Santa María in Cadiz received an unexpected envelope through the post, she was surprised to discover that it contained a number of mushrooms, so she reported the find to the National Police.

Once they had seen the suspicious fungi, the officers sent them for analysis and it turned out that they were from an hallucinogenic family. After some research, officers discovered that a Dutch woman in the same town was sending a number of similar envelopes around the world on a daily basis.

Officers obtained a warrant to enter the suspect's home in Santa Maria where they discovered more than 500 grams of mushrooms in different stages of growth, 28 boxes containing seeds [spawn/spores?], scales, and documents that showed that the woman was importing the "seeds" from Holland, was growing the mushrooms herself, and then advertising them for sale through the Internet.

Charging €50 for each sending, she was making deliveries as far afield as Australia before her arrest.

## 99 MILLION YEAR OLD MUSHROOMS FOUND IN BURMESE AMBER

Ian Johnston

<http://www.independent.co.uk/>, Mar. 16, 2017

Astonishingly well-preserved mushrooms that were trapped in amber some 99 million years ago have been discovered in a museum collection in China.

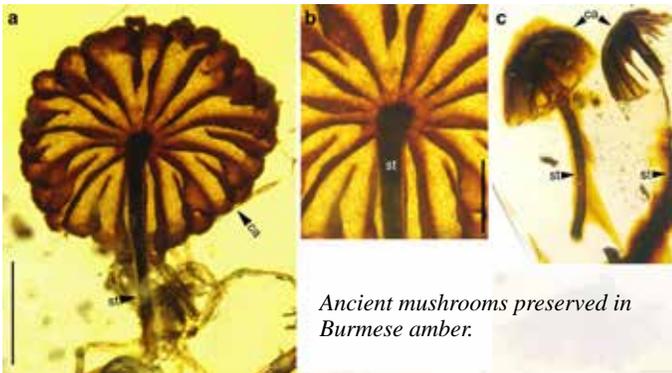
The researchers also found similarly pristine beetles that are 125 million years old, again encased in amber, which is clear tree resin that sets hard then fossilizes over time.

The oldest amber mushroom ever found is only a million years older than the newly described examples, which were found among 111,000 pieces of amber from Burma, in the Nanjing Institute of Geology and Palaeontology in China.

The researchers appeared taken aback by how well the latest discoveries were preserved and also how similar to modern mushrooms they were.

“Most [mushroom] fruiting bodies are ephemeral, and their fossil record is limited,” they wrote in the journal *Nature Communications*. “The discovery of four mushroom forms, most with a complete intact cap containing distinct gills and a stalk, suggests evolutionary stasis of body form for 99 million years.”

A statement issued by the Chinese Academy of Sciences about the discoveries said the mushrooms were “very well-preserved.” A 440-million-year-old fossil of a fungus that looked like a mushroom has also previously been discovered in Scotland and Sweden.



*Ancient mushrooms preserved in Burmese amber.*

## CHINESE DOCTORS REMOVE MUSHROOMS STUCK IN WOMAN'S STOMACH

various sources, Mar. 24 2017

The 50-year-old chowed down on what she thought would be a delicious meal of dried shiitake, but it landed her in the hospital.

The woman is believed to have cooked the dried mushrooms without soaking them first, meaning that when they entered her stomach and became damp they expanded.

She went to the hospital with a severe stomach ache where doctors discovered her problem.

According to Dr. Wang Weifei, who treated the patient, “Our scans showed that the woman’s duodenum, which is where the stomach meets the small intestine, had been obstructed by several mushrooms.”

She underwent surgery and medics removed all the mushrooms.

“While many of them were in pieces, we also found a whole mushroom inside measuring around 7 cm in length,” medics said.

She has since recovered from the operation and is believed to have been discharged already.

Perhaps a timely reminder that when you eat dried food, you should make sure it is prepared properly.

*Scans showed mushrooms lodged in woman's gut.*



## RISE IN DEADLY FUNGI IS CONTAMINATING RIVER WATER IN INDIA

V. Nilesh

[http://www.newindianexpress.com](http://www.newindianexpress.com/), Mar. 13, 2017

HYDERABAD - Rivers are polluted not only by industrial effluents, chemicals, sewage, heavy metals, and antibiotics but also by pathogenic species of fungi. These pathogenic fungi not only destroy the ecosystem by causing infections among fish and other aquatic species but can also cause harm if the contaminated water or the infected fish is consumed by humans.

Two researchers from the mycology and plant pathology lab of Osmania University’s College for Women discovered that around 50 species of pathogenic fungi are present in the Munneru river. Munneru serves as an important source of drinking water for lakhs of people in Khammam district. It is also a tributary to Krishna river and joins it in Andhra Pradesh where again it is used for drinking purpose.

A major reason for pathogenic fungi thriving in the river is the letting in of untreated sewage and industrial waste water from cities and towns directly into the rivers. While Telangana generates around 1,671 million liters per day (MLD) of sewage, only around 686 MLD are treated in sewage treatment plants before release, whereas the rest is directly let into the rivers. Prof. Gaddam Banerjee of Fisheries Research Laboratory at Kakatiya University says, “The untreated sewage and industrial wastes like cellulose which is used in pharmaceutical industry provide the required nutrients for fungi to thrive in river water. They can survive and grow in the flowing river water as well.”

Prof Banerjee said, “The pathogenic fungi lead to a disease known as Epizootic Ulcerative Syndrome in fish which causes death. The fungi also grow on the bodies of fish and cause an abscess...from which infection occurs, causing deaths. As part of the studies I did in northern Telangana districts, I found that there is a rise in pathogenic fungi in river waters, especially of one fungus known as *Saprolegnia* which affects internal organs and deeper tissues of fish.” He further said, “If a fungus-infected fish is consumed without cooking properly or if the infected water is consumed directly, the fungus can release spores and can cause severe infections in humans too.”

## FUNGAL COMPOUND BOOSTS AXON REGENERATION, OFFERING CLUE FOR MS

Magdalena Keg

<https://multiplesclerosisnewstoday.com>, Mar. 14, 2017

The idea of repairing damaged axons—a key component of advancing disability in multiple sclerosis (MS)—just got closer to reality, with the discovery that a compound found in fungi triggers axon regeneration, making damaged axons grow “like weeds.”

Scientists have long struggled to find compounds that stimulate the repair of axons, the long, thread-like neuron appendages that send signals to other cells.

The study, “Small-Molecule Stabilization of 14-3-3 Protein-Protein Interactions Stimulates Axon Regeneration,” appeared in the journal *Neuron*.

The discovery was made with the help of Ph.D. candidate Andrew Kaplan, working in the laboratory of Dr. Alyson Fournier, a neurology and neurosurgery professor at Canada’s McGill University. Fournier’s team had been focused on axon regeneration for some time, particularly a group of proteins with known neuroprotective properties called 14-3-3.

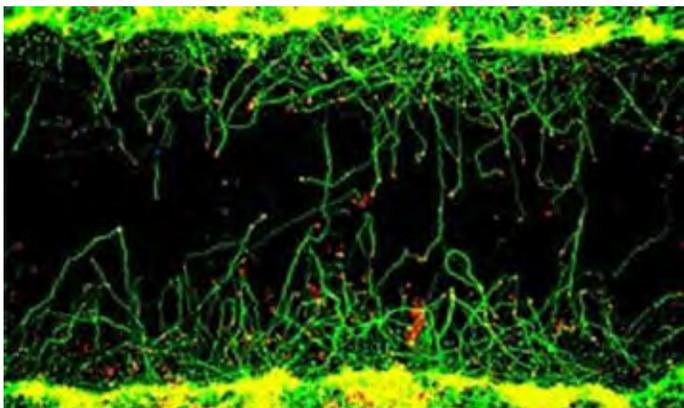
Previous studies had shown that when plants are hit by certain fungal infections, they react by shedding their leaves and growing roots. The fungal molecule responsible for this, fusicoccin-A, is known to affect 14-3-3. So while plant roots and human nerve cells are indeed very different natural phenomena, Kaplan figured that these insights may prove valuable.

“While 14-3-3 is the common denominator in this phenomenon, the identity of the other proteins involved and the resulting biological activities differ between plants and animals,” said Kaplan in a news release.

The team decided to use fusicoccin-A to treat lab-grown neurons with damaged axons.

“When I looked under the microscope the following day, the axons were growing like weeds,” said Kaplan.

The weed analogy is not an exaggeration. In the microscopy photograph, axons appear in green, and the damaged area dominates the center of the image. Taking a closer look, nearly all the axons’ tips are red. The team used a red dye to stain the growing part of an axon, and the red dots throughout the picture reassure us of the activity going on in that lab dish.



McGill University

Treatment with fusicoccin-A induces regeneration of damaged axons (green) toward the center of the injury.

The team now seeks a deeper understanding of how fusicoccin-A makes the neurons grow. Researchers have already learned that a protein called GCN1 is involved in the process. GCN1 and 14-3-3 need to physically bond for fusicoccin-A to boost axon growth. They are now examining if GCN1 could be a suitable drug target for more specific treatments to trigger regeneration.

“We have identified a novel strategy to promote axon regeneration with a family of small molecules that may be excellent candidates for future drug development,” concluded Fournier. “This is an exciting advance because the field has struggled to find treatments and identify targets for drugs that stimulate axon repair.”

## SCIENTISTS DEVELOP “TROJAN HORSE” MOLECULE TO FIGHT CROP FUNGUS LINKED TO CANCER

Reuters.com

via *The Spore Print*, LA Myco. Soc., Mar. 2017

Scientists have developed a new method to neutralize a dangerous fungal toxin affecting crops that can lead to cancer, childhood stunting, and other health threats.

Researchers from the University of Arizona (UA) said they had created a genetically modified maize plant that is edible even when infected with a mold that produces aflatoxin, a carcinogenic substance.

About 16 million tons of maize, equivalent to almost the total output of South Africa, is thrown out each year worldwide owing to contamination, as even small amounts can make an entire harvest unsafe for consumption.



Ear rot of corn caused by *Aspergillus flavus*. There are many classes of aflatoxin, but most are produced primarily by the fungi *Aspergillus flavus* and *Aspergillus parasiticus*.

In developed countries, commercial crops are screened for aflatoxin. But in many parts of the developing world contaminated food often ends up on the plate, as crops are not tested and small farmers depend on what they harvest to eat, the researchers said.

“People are unfortunately consuming unknown and dangerous levels of these toxins pretty much on a daily basis,” said Monica Schmidt, assistant professor at UA’s School of Plant Sciences.

The problem is heightened during droughts—whose frequency is expected to increase with climate change—as the fungus spreads more easily among stressed crops, she said.

In a study published in the journal *Science Advances*, Schmidt and her team said they had created a genetically engineered maize plant which produces a “Trojan horse” molecule that jumps onto the fungus and shuts down its aflatoxin production.

cont. on page 6

## Aspergillus, cont. from page 5

Schmidt said the method should be transferable to other crops prone to aflatoxin contamination, like rice, soy, and peanuts, as it exploits a naturally occurring biological mechanism known as RNA interference.

The method also has an advantage over other practices currently used to fight aflatoxin, like vacuum-sealed storage bags, as it tackles the fungus in the field rather than after harvest, Schmidt told the Thomson Reuters Foundation by phone.

She said initial analysis suggested the modified corn should not have any side-effect for consumers, but extensive field tests still needed to be conducted.

The toxin has been linked to stunted growth in children, increased risk of liver cancer, and higher susceptibility to HIV and malaria.

In 2004, Kenya suffered severe outbreaks of aflatoxin poisoning, which affected more than 300 people and killed more than 100 following a prolonged drought, according to the International Livestock Research Institute.

## LOUD, THE WOUNDED HEARTS OF SACRED TREES

*The Spore Print*, LA Myco. Soc., Jan. 2017

*It starts with ambrosia beetles wounding a tree, then infection by parasitic Ascomycetes, and finally a heavenly scent.*

Oud, with its sweet balsamic smoky woodiness, is one of the rarest, and most beautiful scent ingredients whose path to your bottle is so strange it seems almost mythical. It is also in danger of being lost forever.

For the last 10–15 years, Westerners have been buying fewer perfume products while fragrance sales in the emerging economies are exploding. Smart higher-end perfumers have been gearing more towards the Middle Eastern markets and their inexhaustible love of perfume. The average Middle Eastern consumer goes through 100 ml of perfume in 4–6 months. A Western consumer may take years to go through a 100 ml bottle.

As Western perfumers have tried to integrate Middle Eastern scent sensibilities into their lines, Oud, a worldwide superstar, has become big business. A kilo of average raw Agarwood, the source of Oud oil, will cost between \$10,000 and \$14,000. A kilogram of high-quality old-growth pure Oud oil can cost \$100,000. For comparison, the police value a kilogram of cocaine in the US at \$77,000.

So what makes this stuff more expensive than cocaine?



*First pull of Oud oil from about a ton of Agarwood.*

## What is Oud?

Oud is also known as Agar, Agarwood, Aloeswood, Lignumwood, and Eaglewood. For simplicity sake, I will call this divine ingredient Oud when it is distilled into oil and Agarwood when it is in its raw form. Agarwood isn't itself a tree. It's a bit complicated.

The story starts with *Aquilaria* and *Gyrinops* trees, fast growing evergreens native to India and Southeast Asia. There are about 15 varieties that can become Agarwood.

The process starts when the tree gets injured. This injury is traditionally done by the Ambrosia Beetle which bores into the tree. The wound then needs to get infected by a parasitic Ascomycete. That infection leads to an immune response by the tree that creates a fragrant resin that attempts to penetrate and isolate the infected area, but the story doesn't end there.

An infection in the sapwood, the newer growth rings of a tree, doesn't produce as intense a fragrance. The infection needs to get to the heartwood (the wood in the center of the tree). If the tree is healthy, the heartwood is pale and odorless. Should a potent infection spread to the heartwood the tree would die, but Ascomycete fungi are parasitic, so infected trees lumber along trying to isolate the infection, spending enormous amounts of their resources fighting it. The longer the resin penetrates the heartwood, the better. The wood will turn from pale to dark brown or black and grow more fragrant with time.

Ideally, Agarwood shouldn't be harvested before the tree is 45 years old. Some of the priciest and rarest Oud oils come from trees that have been infected for about 100 years. Those trees are gone now, but some of their ichor still remains for those who can pay for the pleasure.

The wood is usually hydro or steam distilled. There is some debate over which method is better, but both are preferred to CO<sub>2</sub> extraction. The first pull from the distillation is always the best, and a second or third batch will produce lesser quality Oud. All batches will need filtering, aging, and sunning before the oil will be suitable for sale to perfumers and scent manufacturers. It takes 70 kilograms of wood to make 20 milliliters of essential oil through steam distillation, so it becomes hard to keep up with demand.



*Old Agarwood trees.*

To shortcut the process, Agarwood plantations now have introduced human-inflicted injuries and purposely infected saplings to try to get the trees to distillation in 12 years. The result, however, is an inferior product, often referred to as Fake or Faux Agar. Make no mistake the market is huge, and legal and illegal Oud production can barely keep up.



*Young Agarwood trees.*

### Oud in History, Sacred and Medicinal

Oud has a history in perfumery going back thousands of years. It literally has a cult following beyond the trendy perfume counter.

The Aloe mentioned in the Bible is not *Aloe vera*, a misunderstanding due to poor translation, but Oud. Aloes are referred to at least five times in the Old Testament. It may also be the aromatic bark listed in the ingredients for the temple incense burned in the Holy of Holies in Jerusalem. In the New Testament, Nicodemus buys powdered Aloeswood for the embalming of Jesus. Embalming and applying unguents to the dead are strictly forbidden in Judaism, then and now. It is evident, however, that throughout the biblical writings Aloes (oud) was considered rare, wonderful, sacred, and I dare say, erotic.

*“I have perfumed my bed with myrrh, aloes and cinnamon.”*  
*Proverbs 7:17*

The prophet Mohammed was said to scent his home with Oud, and Agarwood is mentioned in the Quran as one of the plants in Paradise. Twice a year the Kabba, the most sacred site in Islam, is washed with a mixture of water from the Well of Zamzam, Tariff rosewater, and Oud.

Oud has a long history in Ayurvedic medicine and is mentioned numerous times in the Vedas, which is the oldest body of Sanskrit literature and one of the oldest written texts in the world.

In Wa Zhen’s 3rd Century CE chronical “Strange Things from the South,” he mentions its production in the mountains of what is now Vietnam. In 1580 the Nguyen Dynasty of Vietnam established a royal monopoly on Oud, which they called Calambac, and this act single-handedly financed the state during the tumultuous first years of their rule.

It was indispensable in the Heian period in Japan and is still essential to Shinto practices. It remains the main ingredient in Japanese and Indian incense.

### The Precarious Future

If you have a perfume that contains old-growth Oud, you may want to save it, because your kids will probably never get to enjoy it. As mentioned earlier, the old trees are already gone, and the plantations are not giving new trees enough time to develop. The wild trees in India died out the 12th century, and those in Southeast Asia are considered endangered owing to overharvesting. The trade of Oud is now monitored and it is illegal to harvest wild trees, but it still happens. Often whole sections of forests are cut down as poachers look for the trees with the black hearts without any real understanding of the value of their forest and the trees they seek.

Synthetics aren’t much help here either. Oud is too complex to be synthesized profitably. Facsimile chemical profiles are in use, but they do not stand up to the real thing. (However, I have heard of perfumers cutting synthetics into lower quality natural Oud to bring out certain qualities with positive results.)

No more Aquilaria trees, no more Ambrosia Beetles, no more Oud. We as lovers of perfume need to be the driving force behind the protection of these trees. We need to buy smart and question our suppliers. We need to write letters to manufacturers and support groups like the Agarwood Project that are trying to save the trees.

Most importantly I think we need to cultivate the awe we once had for these ingredients. They were unique and rare, you were lucky to smell them once let alone own a bottle of them. We need to treat our perfume like olfactive jewels, not disposable fast food.

## YOU WON’T BELIEVE WHERE MEDICINAL MUSHROOMS ARE POPPING UP NOW

**Emily Laurence**

<https://www.wellandgood.com/>, Mar. 14, 2017



There are some ingredients you almost expect to be in your nutrition bar: Almond butter? Sure. Fruit? Awesome. But Purely Elizabeth—known for its delicious probiotic granola and nutrient-filled oatmeal—is changing the game by launching a whole new wellness bar line all made with (wait for it) mushroom powder.

“Our mission is creating products using innovative ingredients, and after I discovered the extraordinary health benefits of mushrooms and that they have been used for thousands of years to promote health, it seemed like the perfect ingredient to include in our products,” says Elizabeth Stein, founder and CEO of Purely Elizabeth and certified holistic health coach.

And Stein has seen their powers first hand, by sipping on mushrooms. “You really notice the difference right away,” she says. “The blend I drink [a mixture of reishi and *Cordyceps*] has given me sustained energy and focus throughout the day, no crash or jitters.” She started experimenting with other functional mushroom blends and loved the results so much that she wanted to bring the benefits to the masses.

The end result is her new line, which was launched a few days ago at ExpoWest, the biggest natural food event of the year, and will be widely available this August (though you can get them online right now). The five new Purely Elizabeth bars each have a different function: Immunity, Mind, Shine, Energy, and Refresh.

They contain different types of mushrooms, many of which are linked to specific health properties. Lion’s Mane, for example, is said to promote cognitive function, which is why the brand uses it in its Brain bar. And Antrodia [*Antrodia cinnamomea*, formerly *Antrodia camphorata*] reputedly gives your body a boost when you’re feeling run down, making it perfect for the brand’s Refresh bar.

Food for function is great, but how exactly do these mushroom bars taste? Since granola, nut butter, and (in a few of ’em) dark chocolate are still key ingredients, they still feel like a treat. And yes, they’re completely safe enough for kids to snack on.

## GET INTO THE WOODS AND LOOK FOR THIS LOVELY HARBINGER OF SPRING

Brian S. Luther

This time of year spring fever sets in, and taking walks in the woods is a good remedy. If you do, you just might encounter *Sarcoscypha coccinea* (the Scarlet Cup).

In early March I stopped at Money Creek Campground (Hwy. 2, the Stevens Pass Hwy). There was quite a bit of exposed forest floor along with a lot of lingering snow—the perfect place to look for the Scarlet Cup. Its brilliant color stands out amid the drab browns of the newly exposed forest debris and contrasting white snow. It's like an Easter egg hunt, with the reward being a striking and very pleasing, eye-catching splash of unexpected color. The Scarlet Cup grows on woody debris in both deciduous and conifer woods, but it seems to be more abundant in mixed woods. It's often found on sticks about an inch or less in diameter, but the collection shown here was growing near the ground directly on a young, but dead, still standing Western Hemlock trunk covered in moss. (For more details about this species, including microscopic features, see my earlier article, Luther, 2011).



Brian S. Luther

### Reference

Luther, Brian S. 2011. *Sarcoscypha coccinea*: A superb cup fungus from Washington State. *Spore Prints* 469 (Feb.), pp. 3–4. Online and in color at [www.psms.org](http://www.psms.org).

## FEARED US OUTBREAK OF FATAL FUNGUS CONFIRMED BY CDC

Jenn Gidman

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The CDC warned American hospitals last year to keep an eye out for the emergence of a possibly fatal, drug-resistant yeast infection, and now the agency's fears may be realized. CDC officials tell the *Washington Post* that 35 patients in the US have been stricken with *Candida auris*, a fungus that can cause bloodstream, wound, and ear infections, with another 18 people harboring the microbe without becoming ill. Some strains of the pathogen don't respond to the three main classes of antifungal drugs, and based on the small number of cases health officials have had the chance to review, 60% of patients hit with *C. auris* have died (though the agency notes many of those patients had other serious medical issues they were contending with). The fungus is contagious and durable, especially in health care facilities, where it can stick around on furniture and other equipment for months.

The first *C. auris* strain was reported in 2009 in Japan. It has since spread around the globe, including to Colombia, India, Israel, Kenya, Kuwait, Pakistan, South Korea, Venezuela, and the UK. The first US case was reported in 2013. The CDC's latest report places 28 of the incidents in New York state, with other affected states including New Jersey, Maryland, Massachusetts, and Illinois. Some good news is that *C. auris* hasn't morphed yet into new strains, and most people's chances of contracting it are very low, with it only affecting "the sickest of the sick," says CDC infectious disease specialist Tom Chiller.

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