



Symbiosis[®]

Fall 2023

The newsletter of the Prairie States Mushroom Club

<https://www.facebook.com/PSMCOfIowa>

<http://iowamushroom.org>


Message from the President From the Editor

by Sarah DeLong-Duhon

by Dave Layton



Me and my NAMA_MX23 roomie who is the Events & Fundraising Chair, and Newsletter Editor of the Minnesota Mycological Society.

Hens, chickens, and puffballs oh my! We have had a pretty good fall season to make up for the bone-dry summer we had this year. The days are getting darker and colder, but don't let that keep you from finding scarlet cups beneath the snow or huge shelf mushrooms high up in the leafless locust trees. There are still mycological wonders to behold, and if you'd rather stay inside, why not settle down with a good nature book? When the snowstorms come, I will be working on Braiding Sweetgrass by Robin Wall Kimmerer. See you next spring! 

Mushrooms the Beautiful

In this issue we will focus on some of the ways that mushrooms are considered beautiful by our different contributors, whether they are the beautiful exotic mushrooms that Sarah experienced in Mexico or the strange appearance of even our most common mushrooms as they emerge. Glen will share some lovely mushroom gifts and Amanda Flaata will give us the opportunity to explore vivid mushroom colors with three mushroom coloring pages. Plus we'll provide photos of each mushroom species she outlines. Most of those photos and several others in this issue were taken by Jim Frink so the colors will be accurate yet brilliant. Our gallery of baby

(cont. on pg. 2)

The Future of Mycotechnology

by Dana Sausa

Discoveries in the field of mycology have captured the imagination of biotechnology innovators. Mycotechnology solutions continue to be developed to address things like soil erosion, pollution, and climate change. Additionally, mycologists and entrepreneurs are looking toward the future to do more with fungi than fix problems.

Mitchell Roth, an assistant professor of plant pathology at The Ohio State University had this to say about the future of mycotechnology, "There's so much potential in fungal biotechnology that we haven't tapped into. We've only just scraped the surface of fungal biotechnology." Ohio State News reporter Tatyana Woodall explains,

Intertwining biotech and mycology could stimulate the development of bioinformatic tools and sustainable biomaterials, such as machine learning algorithms for predicting mycological patterns, or the creation of fungal batteries.

(cont. on pg. 2)

This issue's theme:

Mushrooms the Beautiful

Table of Contents

Message from the President	Pg. 1
From the Editor	Pg. 1
The Future of Mycotechnology	Pg. 1
NAMA's First Mexico Foray...	Pg. 3
Answers to Summer 2023 Crossword	Pg. 4
Featured Fungus - <i>Volvariella bombycina</i>	Pg. 5
Mushroom Gifts	Pg. 6
Baby Mushrooms A Gallery	Pg. 7
Actual Mushrooms on the Coloring Pages	Pg. 10
Coloring Pages	Pg. 13
Crossword Puzzle	Pg. 16

The Future of Mycotechnology

(cont. from cover)

PacBio and Nanopore are two DNA sequencing platforms that have revolutionized the process of fungi taxonomic identification. Before these sequencing platforms, mycologists needed to culture and isolate specimens in a laboratory thereby increasing the analysis period to determine taxonomy. With these tools, mycologists are identifying fungi much faster which means that entrepreneurs are quickly discovering novel applications for previously unidentified fungi.

It is estimated that there are over three million fungal species but less than one hundred fifty thousand species have been described. Innovations in sequencing technology open the door to incredible opportunities for entrepreneurs in the field, especially when paired with other emerging technologies such as Microencapsulation.

Mycorrhizal fungi grow in association with plant roots to form a symbiotic relationship. Ninety percent of terrestrial plants are connected to some form of mycorrhizal network. Fungal organisms are responsible for maintaining soil structural integrity. When farmers till the soil they break up that structure.

Soil degradation means a loss of water-holding capacity. As precipitation pushes soil off farmland, pollutants like pesticides, phosphorous, and nitrogen end up in the nation's waterways. Soil erosion is an existential threat to humanity.




Yphen logo

Yphen is the European leader in mycoremediation—fungi-based bioremediation methods to cleanse contaminated soils. The company's missions are to decontaminate polluted soil, restore degraded soil, improve farmland yields, and sequester CO2 in soil.

Microspheric encapsulation of fungal organisms with active ingredients, bacteria, and minerals is a mycotechnology. Yphen has pioneered to give their customers a product that is shelf stable, offers a controlled release for continuous treatment, is easy to transport, is targeted for each unique site, and is simple to implement

with no need for major resources or soil compaction. Yphen explains that its product is “transforming nature into an efficient, economical product.” In a nutshell, their patented technologies mobilize “the pollution-removing powers of certain fungal organisms.”

Mycotechnologists are largely driven by the mission to create a circular economy that limits inputs and waste, while prioritizing environmental regeneration. Third-generation DNA sequencing platforms have made fungal biotechnology economically and ecologically attractive to entrepreneurs looking to make a green impact on society. 

From the Editor (cont. from cover)

mushrooms will have pics by Jim, plus some from our SmugMug gallery and even a few from me. One pic will be from Dana Sausa and several amazing pics will come from Loulwa Soweid who also provides our crossword puzzle. We're making a print friendly version of this issue for folks who want to do the coloring or maybe frame some of the wonderful pics featured in this issue.

Dana will also share how mycotechnology can help foster the health and beauty of our world, and we'll share an excerpt from Loulwa's featured mushroom, silky sheath, from the PSMC Website. Silky sheath is one of North America's most beautiful mushrooms so you can rest assured that several of them will grace this issue starting with the one I'm holding below. So enjoy the beauty of the mushrooms in this issue even if one of them is being held by a homely old fart.



NAMA's First Mexico Foray - Like a Beautiful Dream Only Real

by Sara DeLong-Duhon



I dream about fungi a lot. Those dreams are always centered around the joy of finding them, like going on an Easter egg hunt or opening presents. I'll be tottering about in some wacky dreamscape – with or without my pants – and suddenly I will stumble upon them. Giant morels lining a pond, illuminated by moonlight. Impossibly purple *Cortinarius* beneath gnarled, wizened oaks. As happens in dreams, I try to photograph them, but I realize I didn't bring a camera. I want to pick them, but I can't pick up my feet to walk. And I'm off to the next dream sequence, confused and unsatisfied.

In the mountains of Mexico, I found these dreamscapes in physical space. In the forests of the San Francisco Oxtotilpan, huge porcini hid mischievously in pine needle shrumps, trying to avoid my eye. Knee-high *Amanita muscaria* congregated in flamboyant clusters, begging to

be seen. Other mushrooms waited patiently to be found, to be ooh-ed and ahh-ed at by my eager fellow myco-enthusiasts. I found a cluster of fat little blue-staining boletes whose sticky yellow cap then stained my fingers like turmeric. We found *Turbinellus* which were the color of the sunset or candy corn. We found ghost pipe flowers that – though the same species as the white ghost pipes so abundant in Iowa – were blush pink. A towering husk of a tree, too big for even two people to hug, was covered in chunky young shelf mushrooms, all too happy to help turn this behemoth into soil for the next generation. The people I met in Mexico see value in their forests that most people are blind to. They see themselves included in the cycle of life, not masters of it, but they also see the bounty that exists as a result of keeping forests healthy and intact. I got just a taste of this when I participated in the North American Mycological Association's first

(cont. on pg. 4)

Editor's note: Loulwa had planned to write an article on Golden oysters, but she just got a new job teaching (Congratulation Loulwa!) and hasn't had time to complete it for this issue. We hope to see it in the Spring 2024. I still wanted to share some of her writing with you. Recently she posted a lovely writeup for the Featured Fungus on the PSMC website. I've put the first three paragraphs of it in this issue to spark your interest to go to the web page and read more: <https://www.iowamushroom.org/blog/featured-fungus-volvariella-bombycina>.

Featured Fungus - *Volvariella bombycina*

by Loulwa Soweid



Photo by [Linda Gail Price](#)

It is an early spring morning, and you are walking in the woods. It has rained recently; the smell of petrichor is in the air, the earth around you is cool and damp, and it is humid out, but not unpleasantly so. People stroll through the woods for all sorts of reasons, but you trekked out here today on a mission: a sturdy mushroom knife is folded and tucked away in your trouser pocket, an airy mesh bag is clutched in your hand, and a pocket guidebook on Midwestern mushrooms is securely stowed away in the knapsack slung over your shoulder.

Admittedly, you will be pleased with any fungus you find, even one of the not-so-remarkable little brown mushrooms whose identities often evade you. However, you are keeping your eye out for a very specific mushroom today, at once strange and beautiful and relatively uncommon; not so rare that it would be impossible to catch a glimpse of it in a neighbor's garden, or in the less-kempt section of a local park, but still a notable find, and one that has eluded you so far: *Volvariella bombycina*.

(cont. on pg. 10)

Mushroom Gifts

by Glen Schwartz

One thing I noticed after I first joined the Prairie States Mushroom Club was, once I started looking, I was seeing mushrooms everywhere. It continues to this day. And when you pay attention, that includes finding mushrooms in the most unlikely places. Like at Walmart...in the clothing isle! I saw this jacket there a few weeks ago.

You will notice that the mushrooms are just generic "Toadstools". This seems to be the most common commercial method of displaying mushrooms. Here is a closeup view.



Mushrooms seem to be unusually popular lately. I am not sure if this is due to the hit show *The Last of Us*, or if the show was reflecting the popularity of mushrooms (which came first?). In any case, this jacket would make a nice present for any mushroom lover in your life. Next to this was a *Smurfs* jacket with them playing among the toadstools.



Of course, if you have a friend or family member that is an artist, they might draw a nice picture on an Artist's Conk. A number of years ago, a club member drew this nice image for me.



As you can see, after he drew the picture, he let it dry then used colored pencils to make this beautiful image. It is one of my favorite treasures.

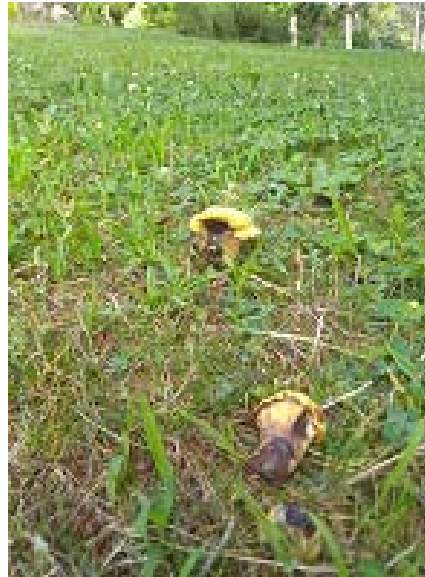
You don't have to be an accomplished artist to make a treasure from an Artist's Conk. The image below shows an up-and-coming artist at work. Earlier this year, while out on a foray, this artist found a turkey feather that she used to draw herself and her cat.



Baby Mushrooms A Gallery

by Dave Layton

I first thought of doing this baby mushroom pictorial after sending Sarah photos of a strange looking fungus emerging from the grass near some planted spruce trees.



I was stumped but Sarah knew they came from a buried root and were in fact baby Dyer's polypore (*Phaeolus schweinitzi*). I was familiar with the species, but I pictured it like this Wikipedia photo of that species.



I thought of how much mushrooms change throughout their lives. I guess they're just like everything else in nature. Of course no one would mistake a morel no matter what size it is, as shown by these SmugMug pix from forays 2018 and sightings 2013. Visit PSMC's SmugMug site for all kinds of cool fungi pics: <https://iowamushroom.smugmug.com/>



(cont. on pg. 8)

Baby Mushrooms A Gallery

(cont. from pg. 7)

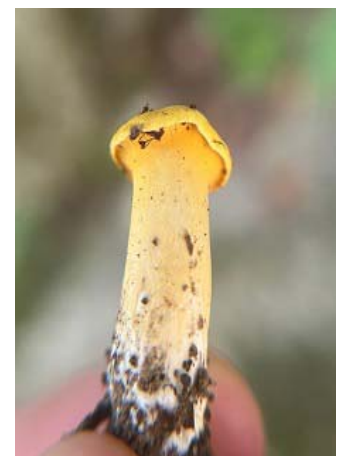
Some fungi are totally mysterious when they emerge, like how does a tree lay an egg? These photos of baby silky sheaths (*Volvariella bombycena*) by Jim Frink (right) and me show you.



Some baby mushrooms like these emergent *Polyporus squamosus* are kind of silly looking so they garner rude names like hog-nose. Loulwa Sowied provides a perfect hognose in the picture with two sporocarps. The smaller one is actually a piglet nose. Terry Rathje sent me the other pic with four of them.



Some baby mushrooms are so cute you could just eat them up right now – which is exactly what happened to these baby honey mushrooms on the left. Hopefully Dana’s *Grifola* toddler was somewhere that she could lovingly nurture its growth, at least to adolescence before snatching it up for mastication, and Loulwa’s infant chanterelle got lots of big brothers and sisters in the next couple weeks.



(cont. on pg. 9)

Baby Mushrooms A Gallery

(cont. from pg. 8)

Some baby mushrooms, like these *L. americana* from Smug Mug (left), seem to be out to make a bold statement from day 1, while others like these shaggy-manes want to hide under the tresses of their big brothers and sisters. Others blast their way into existence like Loulwa's *Amanita* sp. bursting through its sheath with total *Amanita panache*!



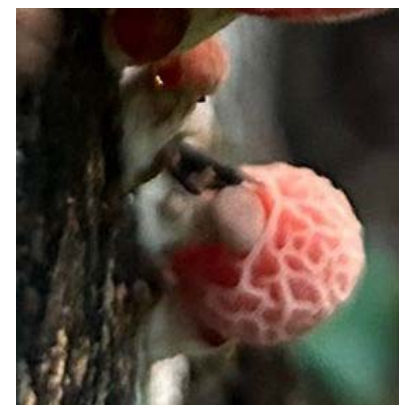
Nothing says baby like bird's nest fungus (*Crucibulum laeve*) on a walnut. Actually the ones starting to cup are teenagers. The true babies in the pic are the little yellow dots next to them. The fluted bird's nest on the right will soon make a dramatic transformation, but I'm not sure where that puts them in their relative childhood. Thanks Loulwa for both pics.



Even the biggest trouble causers are really cute when they're babies, as Loulwa's little golden oysters demonstrate. The ones on the right aren't even ready to shed their baby blanket. Rise and shine little ones. You have some giant trees to destroy.




And, as the first picture by Jim Frink demonstrates, some baby mushrooms' pink bottoms are just plain adorable! In truth the mushroom in his picture is an adolescent. Loulwa's picture (final one) shows rosy veincap (*Rhodotus palmatus*) in its true infancy.



Featured Fungus - *Volvariella bombycina*

(cont. from pge. 5)

As you make your way down a well-treaded path, many of the trees surrounding you appear to be thriving, trunks sturdy and leaves broad and green. However, you notice that some otherwise healthy trees bear dead sections - wounds, knotholes, clefts - and still others have decayed altogether, having become rotting slabs of wood on the ground. The latter two conditions are the ones that you take the most interest in examining, as *V. bombycina* is saprobic (with an alleged affinity for hardwoods). —
Read the rest at <https://www.iowamushroom.org/blog/featured-fungus-volvariella-bombycina>.

Also come back to Featured Fungi page in December to learn about the lovely, interesting and tasty mushroom pictured below, *Sarcomyxa sarotina* (late oyster). 



Actual Mushrooms on the Coloring Pages

Thanks Amanda Flaata for the coloring pages. They look like way cool for kids and adults!

These are the real colors as nature made them. However don't let that stop you from coloring pink shaggymanes etc. Thanks Jim Frink for all the pics except *Lanmaoa* and *Volvariella* from me - Dave

Page 1:



Amanita flavoconia (Yellow Patches)



Lactarius indigo (Indigo Milk Cap)



Trametes versicolor (Turkey Tail)



Coprinus comatus (Shaggy Mane)



Marasmius siccus (Orange Pinwheel)

(cont. on pg. 11)

Actual Mushrooms on the Coloring Pages

(cont. from pg. 10)

Page 2:



Morchella sp. (Morel)



Laetiporus sulphureus (Chicken of the Woods)



Cyathus striatus (Fluted Bird's Nest)



Volvariella bombycina (Silky Rosegill)



Flammulina velutipes
(Velvet Stem)

(cont. on pg. 12)

Actual Mushrooms on the Coloring Pages

(cont. from pg. 11)

Page 3:



Scleroderma citrinum (Common Earthball)



Cantharellus cibarius (Golden Chanterelle)



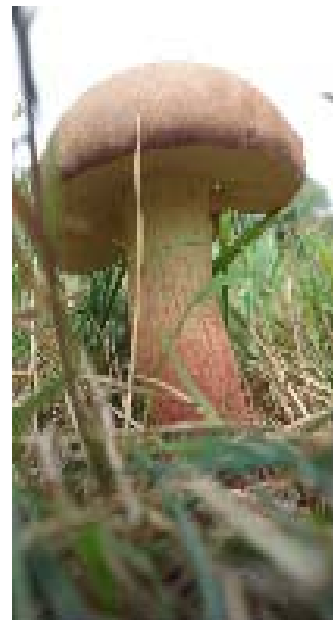
Pholiota aurivella (Golden Pholiota)



Rhodotus palmatus (Wrinkled Peach)

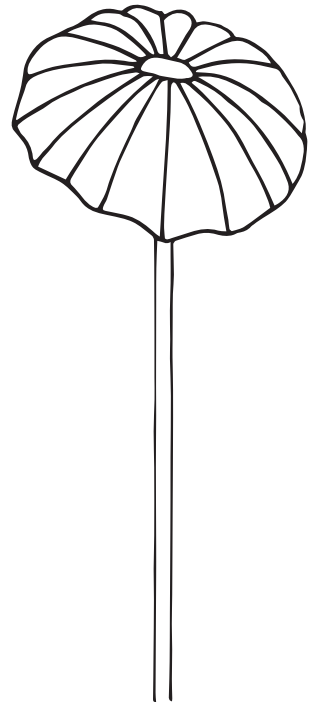
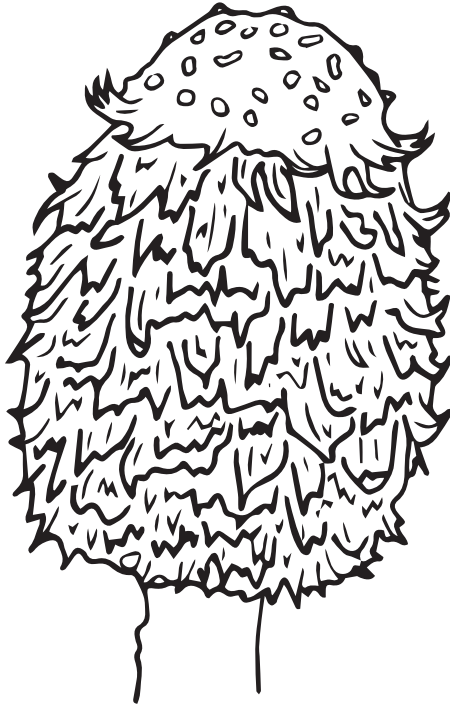
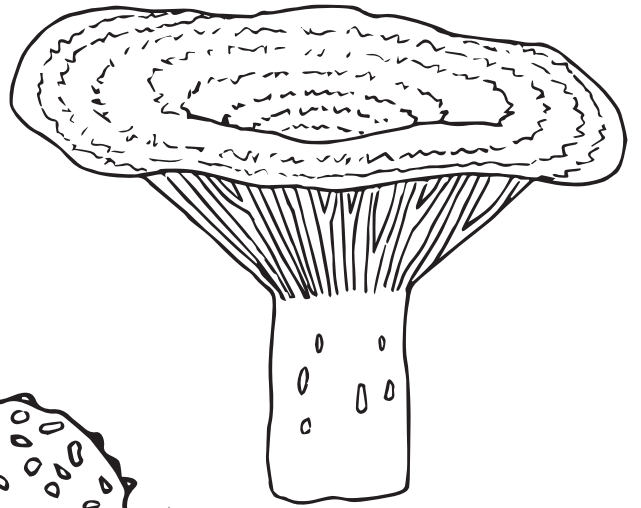
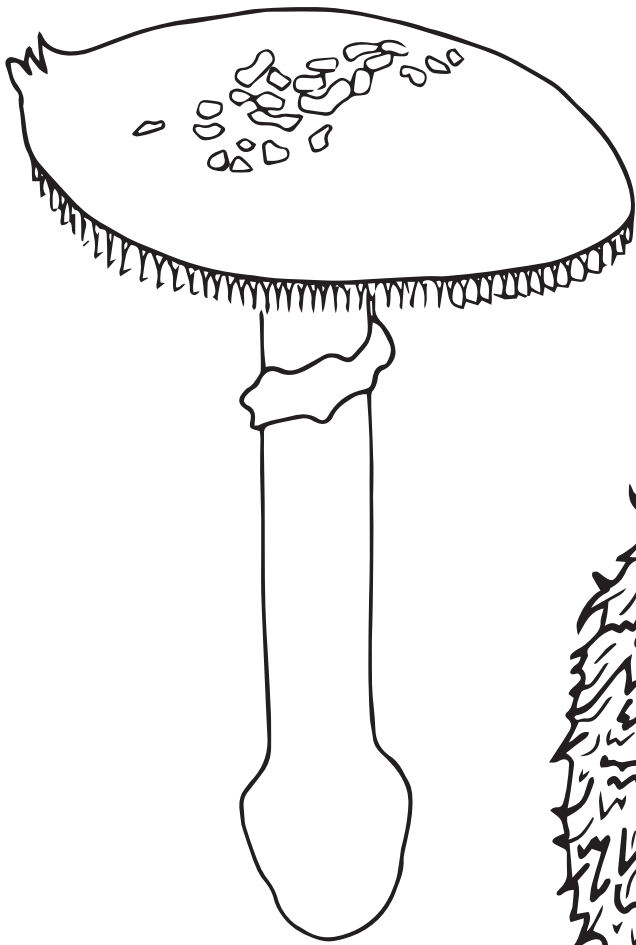


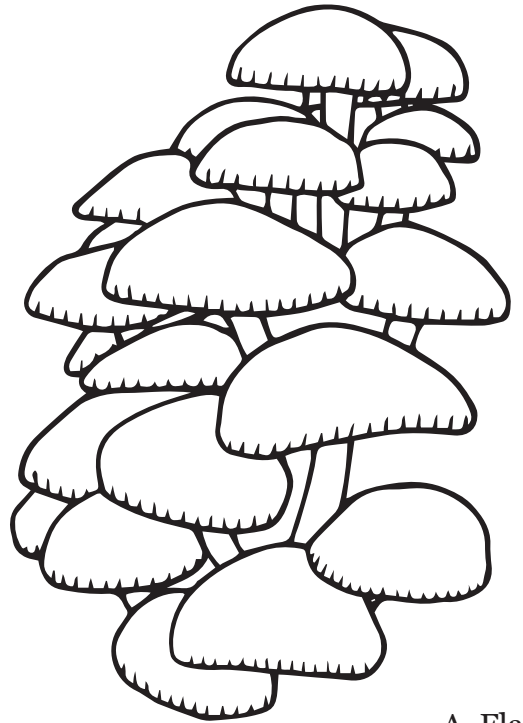
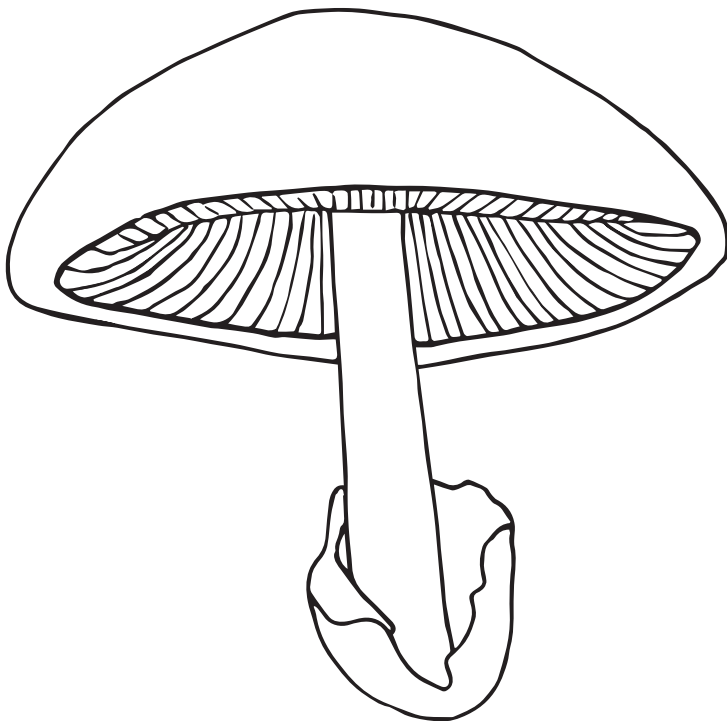
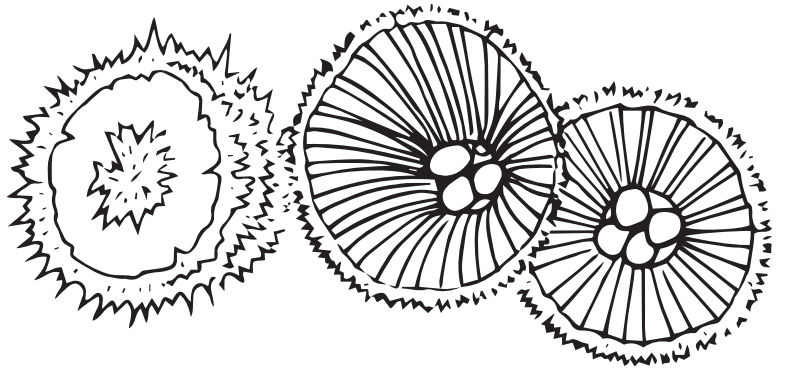
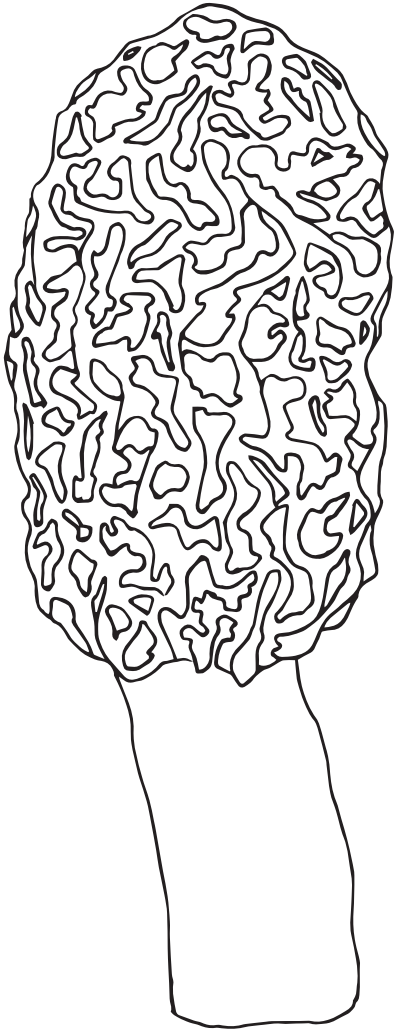
Artomyces pyxidatus (Crown-Tipped Coral)

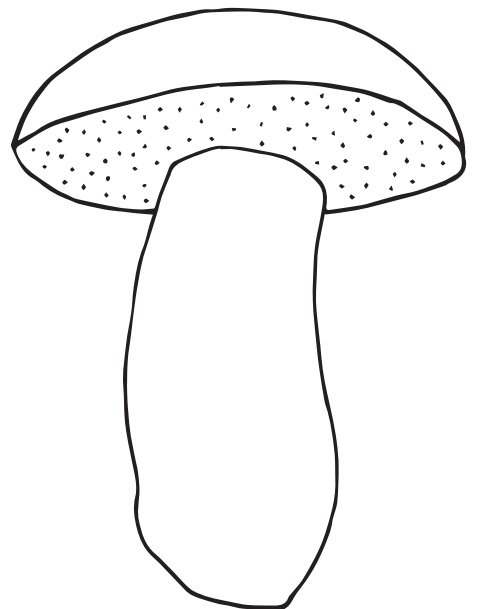
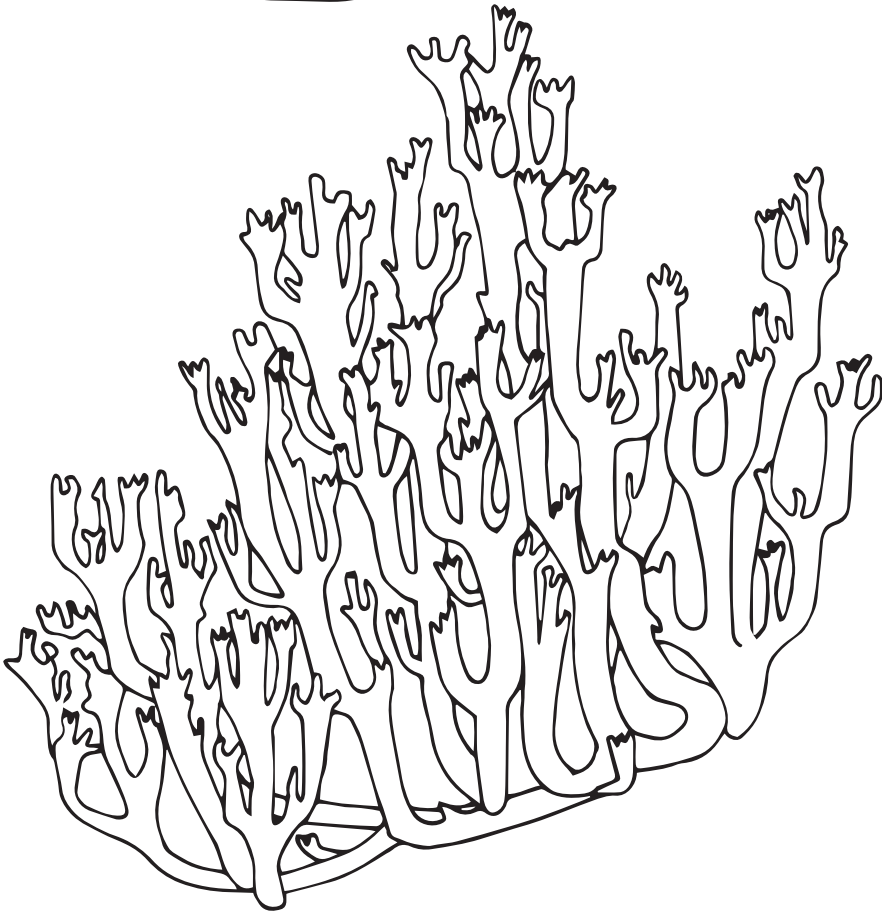
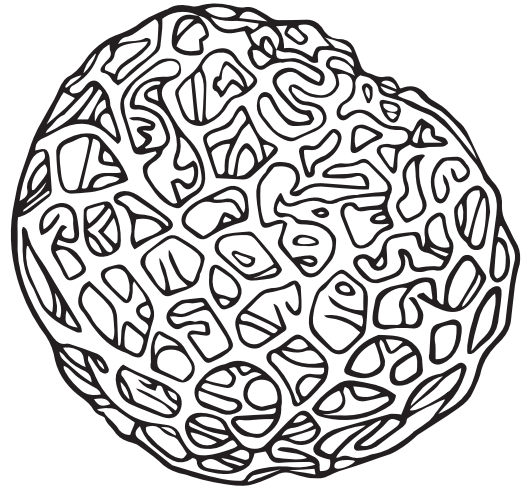
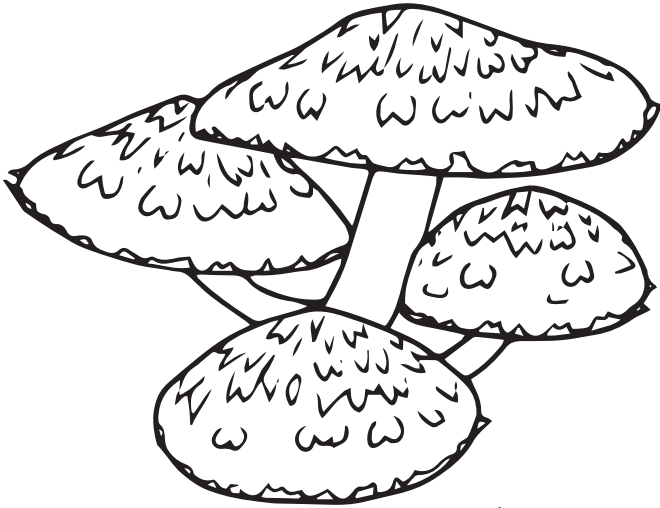
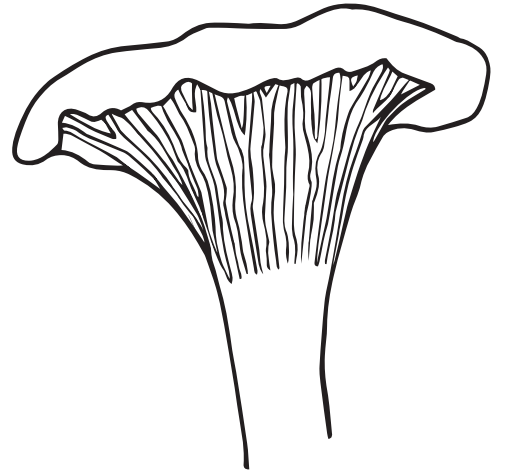
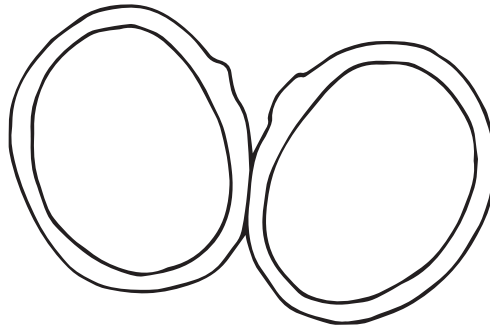
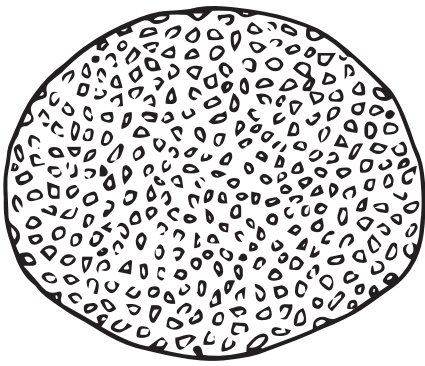


Lanmaoa sp.









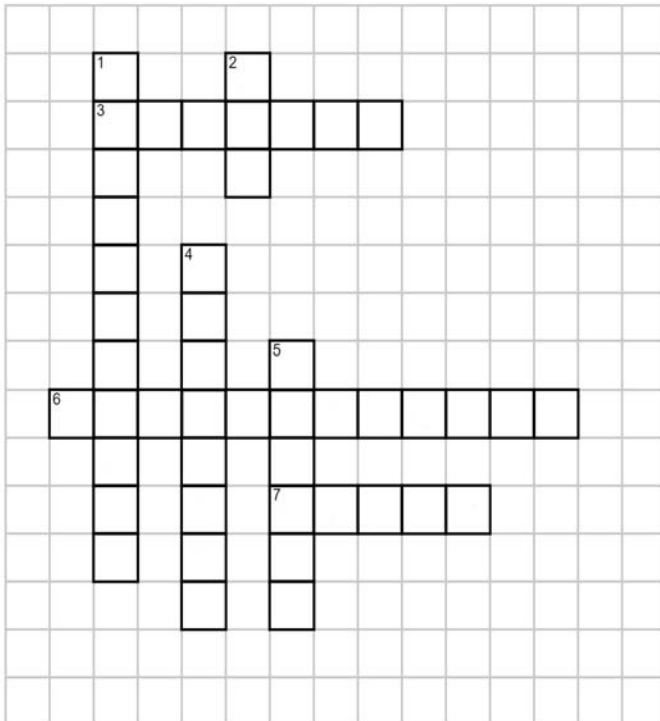


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Crossword puzzle from Loulwa Soweid



CLUES:

Across	Down
<p>3 The scientific term for the remnant of a mushroom's partial veil; it looks skirt-like in appearance</p>	<p>1 You would use this word to describe the scent of fungi that smell like cucumber or melon rind</p>
<p>6 While most plants are autotrophs, which in simple terms means that they can create their own food from inorganic material, all fungi are this term, which means that they cannot create their own food and need to derive it from other sources of organic materials</p>	<p>2 This self-taught midwestern mycologist runs mushroomexpert.com and has published the extensive field guide "Mushrooms of the Midwest"</p>
<p>7 Ash boletes were thought to have mycorrhizal association with ash trees, but in actuality they maintain a mutualistic relationship with this type of parasitic insect, which feeds on ash tree</p>	<p>4 A root-like network of hyphae that gives rise to the fruiting bodies of fungi</p>
	<p>5 A physical descriptor for mushrooms that have varying zones of color or texture on their caps</p>