MANZANITA

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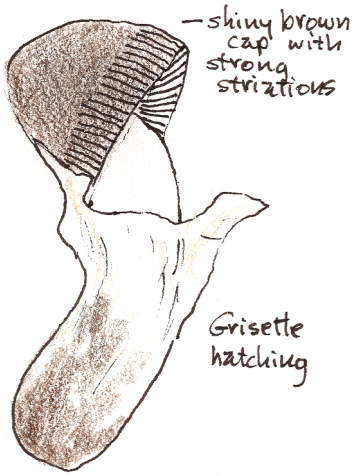
East Bay Amanitas: The Good, the Bad, and the Beautiful

by Debbie Viess



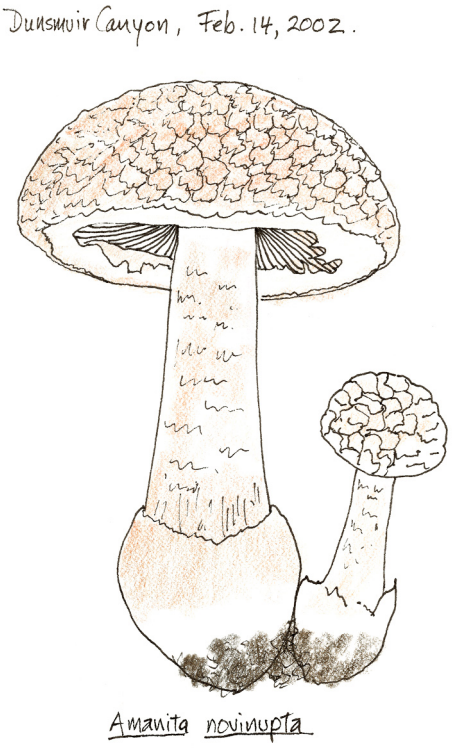
I first fell in love with amanitas on a walk along the Huckleberry Trail. Huckleberry Botanic Regional Preserve is a small jewel of an East Bay park with a plethora of interesting and unusual plants, as well as many interesting and unusual mushrooms. But twenty-odd years ago I didn't know a mushroom, let alone an amanita mushroom, from a hole in the ground!

So when I saw a tiny gray and graceful form growing out of the path, I was stopped dead in my tracks. I dropped to my knees and made a sketch of it on the only paper that I had with me—a bank deposit slip! I carried that scrap in my wallet for years before I could finally put a name to my drawing. That captivating mushroom turned out to be an edible amanita commonly called a "grisette" (*Amanita vaginata* group). It set me on an unexpected path of discovery and changed my focus from zoology and animal behavior to an obsessive passion for mushrooms in general and amanitas in particular.

Why should *you* care about amanitas? Most Americans pay little attention to the world of fungi, organisms that do their important work quietly and mostly unseen by the human eye. As botanical enthusiasts, though, you might give the fungi their due: Almost all of the plants examined to date have a symbiotic relationship with fungi, a partnership that is essential to the ability of both to grow and thrive. Amanitas also feature prominently in human society: Within the genus *Amanita* are both the deadliest as well as the most delicious of mushrooms. No other group of mushrooms inspires such contrasts of fear and delight.

Bay Area amanitas are eye-catching as well as notorious. They occur in a rainbow of colors, from brilliant red to orange, yellow to green, and in more muted colors like browns and grays and whites. These often tall and stately mushrooms are mostly found in mycorrhizal (fungus/root) associations with a broad spectrum of local trees and shrubs, both conifers and hardwoods, native and introduced species.

The ephemeral amanita mushroom is the spore-producing structure of a long-lived fungal mycelium—a vast underground mass of highly branched and anastomosing fungal cells called "hyphae." Extensions of the mycelia wrap around, fuse with, and penetrate between the cells of the smallest roots of their host trees, forming visually distinctive nodes. In essence, tree and fungus become one meta-organism. The fungal mycelium absorbs, stores, and shares water with its plant host, and also provides essential minerals and protection from root pathogens. In return, the tree shares its photosynthesized sugars with the fungus.



Amanita spores are white in mass, thin walled, and of various shapes. If they land in a suitable environment, the spores will grow into haploid

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Manzanita, a quarterly newsletter of the *Friends*, and *The Four Seasons*, an annual publication of the garden, are benefits of membership. The nurseries listed below offer discounts to *Friends*. These participating nurseries are sources for native plants.

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Deadline for submission of announcements and editorial material for the winter issue is November 1, 2009; for the spring issue, February 1, 2009.

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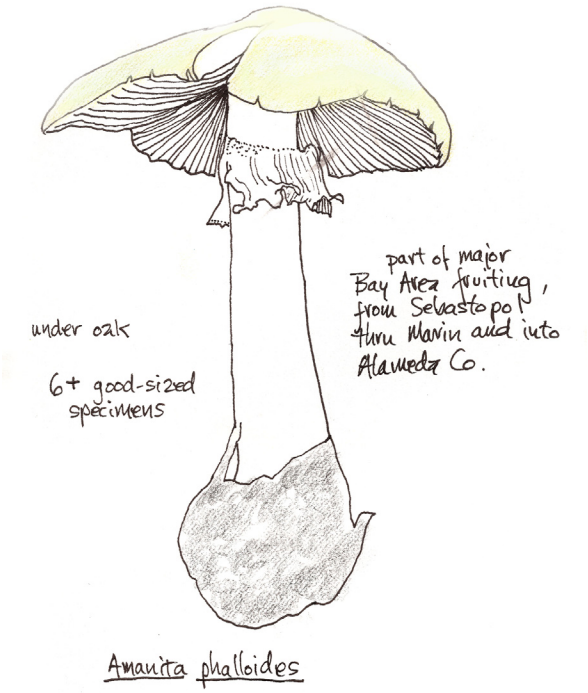
amanita mycelia. Haploid mycelia must encounter and fuse with amanita mycelia of the same species but of a complementary sexual type to produce dikaryotic (functionally diploid) mycelia. When conditions are right and the dikaryotic mycelium has sufficient stores of both sugar and water, mushrooms are produced.

Amanitas stand out from the fungal crowd in a number of ways. They are fleshy macrofungi (molds and yeasts are examples of microfungi) with caps and stalks that grow from the ground. Underneath the caps are white or whitish gills—platelike structures that maximize potential surface area for spore production. In amanitas, the gills normally do not connect up with the stem (or stipe) and are called "free."

A key morphological trait for this genus is that all amanitas start life covered with a tissue called a universal veil or volva. The cell structure of the universal veil determines the look of the mature mushroom. If the hyphal cells are primarily globose, the veil will easily break apart (much like wet Kleenex will pull apart and clump) and form warts as the cap expands, as in the fly agaric (*Amanita muscaria)*. If the cells are mostly elongate and sturdily interwoven, the veil will be membranous and tear cleanly to leave a bald cap and a loose, lobed sack at the base of the stipe, as in the death cap (*Amanita phalloides)*.



Amanitas are some of our most beautiful, prominent, and colorful local fungi. They occur almost year round here in the Bay Area, as long as water is provided. Fog drip and even a sprinkler system can produce mushrooms in parks and other areas of human habitation during our normally dry summers. The bulk of mushroom fruiting occurs during our rainy season, from the first fall rains until the ground dries and the grass browns in the late spring.

Amanita muscaria

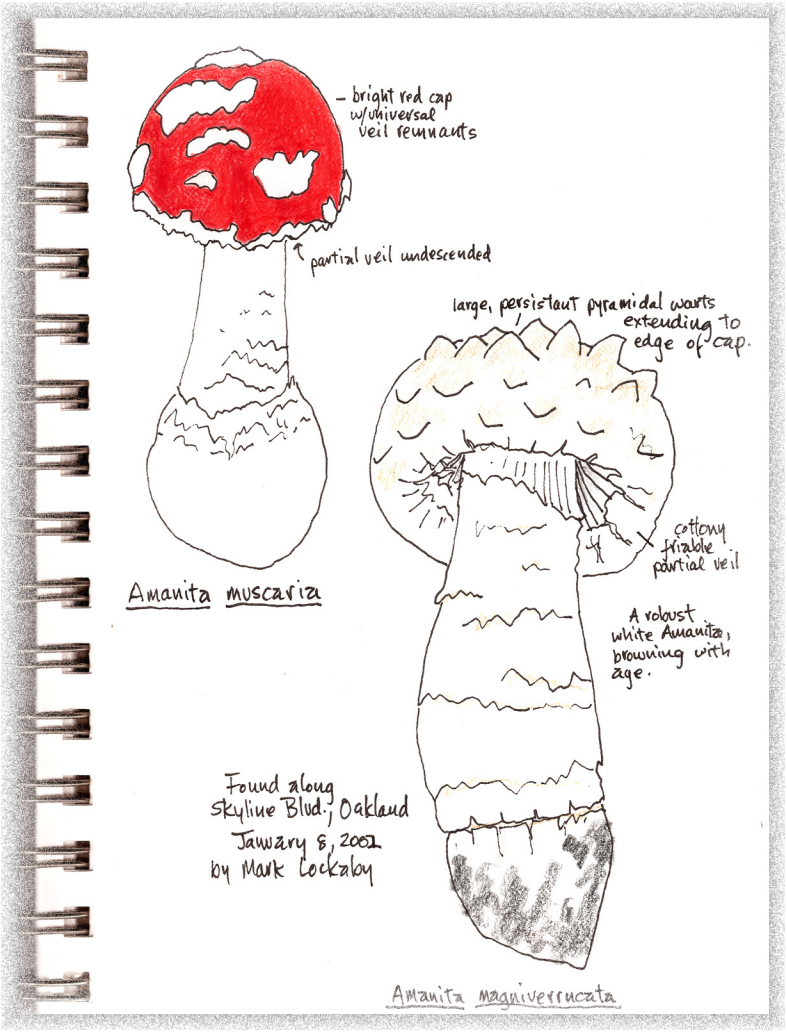
The most iconic Bay Area amanita is the brilliantly red *Amanita muscaria*. This mushroom, beloved of fairy tale illustrators everywhere, is a common mycorrhizal associate of Monterey and Bishop pine. It is a toxic mushroom listed in some field guides as deadly. Deaths from this mushroom are quite rare but can occur while the victim is helpless in a drug-induced coma.

There is one famously fatal case from 1897 of a Count de Vecchi, who died in a Washington, D.C., hotel room while in the throes of *muscaria* poisoning. His death was likely due to a combination of mistaken identity (the Italian Count was a big fan of the eminently edible *Amanita caesarea*), gluttony-fueled overdose, and pre-existing conditions, but this one overblown and widely reported case has colored the *muscaria* toxicity debate for over a century.

Amanita muscaria contains toxins that profoundly affect the central nervous system by mimicking neurotransmitters. Its major toxins are ibotenic acid and its decarboxylation by-product, muscimol. Both ibotenic acid and muscimol are water soluble,

which means they can be leached out through careful parboiling. Indeed, a few small groups of people around the world treat this mushroom as an edible.

However, many cases of nonfatal but highly unpleasant mushroom poisoning can be attributed to eating *muscaria* and its close relative *Amanita pantherina*, sometimes even after parboiling. Therefore, its use as an edible or, for that matter, its use as a psychotropic agent (see *Alice in Wonderland*, Lewis Carroll) cannot be recommended.



Our local red-capped version of *Amanita muscaria* has a creamy yellow universal veil that coats the young mushroom or "button" when it first emerges. This color fades with sun and rain, so the exposed veil remnants and warts eventually turn white. Like all local members of *Amanita* section Amanita, *muscaria* has a bulbous base to its stipe. *Amanita muscaria* also has characteristic rings of veil tissue that surround the bulb. In addition to the universal veil, *muscaria* has a partial veil that covers and protects the developing gills. As the cap expands and opens, the veil drops, forming a skirt or annulus around the stipe. Protected volval tissue underneath this annulus may retain bits of the original yellow veil color.

Amanita muscaria mushrooms are not only attractive to humans. Many woodland creatures appear to relish these fungi, from snails and slugs to the ubiquitous flies, rendered comatose after ingesting the poisons and then easily dispatched. Prior to the invention of flypaper and bug-zappers, bowls of milk with chopped or mashed *muscaria* were used as fly attractants. Mammals, from squirrels to deer, also munch *muscaria*, and gray jays have been observed to eat them in the Pacific Northwest. Domestic dogs and cats can also eat these ubiquitous mushrooms and become dangerously poisoned.

Grisettes are another locally common, nontoxic group of *Amanitas* in section Vaginata. These are tall and graceful mushrooms with brown or gray caps, commonly without warts or patches. Prominent striations edge their caps, even when the caps are young and unopened. All grisettes lack a partial veil, and their membranous volva often produces a long, loose sac at the base of totally elongating (bulbless) stems.

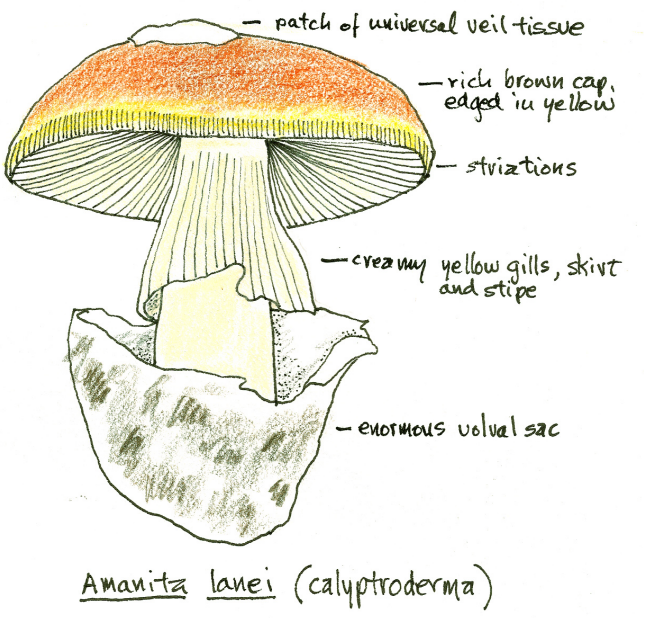
The Bay Area is home to a number of grisette varieties, including *Amanita pachycolea,* our largest grisette, with a knobbed, dark, two-toned cap, and a thick, orange-staining universal veil. *Amanita constricta* has a pinched and flaring volva that is often gray on its inner surface. Various unnamed gray, brown, or white members of the *Amanita vaginata* group can also be found in the Bay Area. According to Dr. Rod Tulloss, world amanita expert, *Amanita vaginata* is a European species that lacks any North American field presence, despite its common inclusion in most North American field guides.

My "pet" grisette is the rare and distinctive *Amanita protecta*. This mushroom, mycorrhizal with live oak, differs from the general grisette form in several ways: Its stature is often thick and squat, its stipe can be heavily ornamented with either dark

Amanita protecta

gray vertical lines or dark chevrons, and its universal veil is unique in having three layers to its composition, as well as many globose cells. This causes the universal veil to break up into warts and patches on the cap and creates a lumpy abbreviated volva at the stipe base. Some of the cells in the volva of *protecta* are actually formed into spirals, which Dr. Tulloss theorizes may allow the mushroom to absorb more water from the environment, a useful quality for a mushroom that prefers to grow in somewhat xeric conditions. I have collected this mushroom in the dry foothills of Mt. Diablo as well as the foothills of the Sierra.

Another group of amanitas well represented in the Bay Area are members of *Amanita* section Caesareae. These are often colorful as well as edible amanitas related to the famous Caesar's amanita of Europe. Many have prominent striations at the cap edge, an annulus, and a loose volval sac on an elongated stem. The most common Bay Area member of this group is the coccora (*Amanita calyptroderma)*.



Coccora appear in the fall and through the winter under madrone. Their large and beautiful golden-brown caps sport a thick patch of white veil tissue, and their stems are adorned with a graceful annulus, which makes them deliciously eye-catching.

My favorite mushroom in the Caesareae group is neither large nor colorful, and rarely identified, although sightings of it in central California are on the rise. This is the curious candlestick amanita (*Amanita calyptratoides)*. It has a dull brown cap and an ephemeral annulus, as well as a distinctive, semitranslucent stipe, reminiscent of a tallow candle, which gives rise to its common name. Formerly believed to be a strictly southern California species, it is unclear whether it is expanding its range northward or (as first proposed by author David Arora) merely being found by better amanita identifiers. I have located it several times under coast live oak in the East Bay, as well as with valley oak in the Livermore Valley.

Amanita calyptratoides

The most primitive amanitas are found within section Lepidella. California lepidellas are white, with highly floccose universal veils. Young mushrooms can appear quite cottony. The universal veil is friable and easily removed by various means. The partial veil is also friable; when broken and in combination with universal veil remnants, it leaves a characteristic ragged or appendiculate margin on the cap.

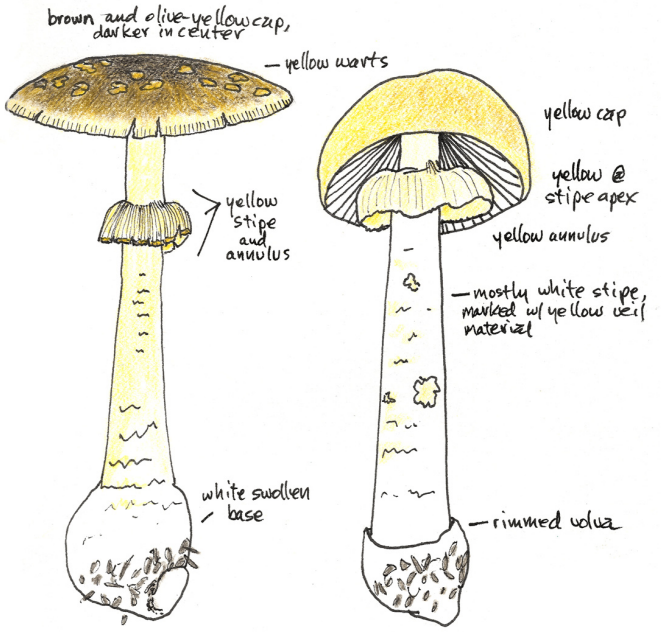
We have a number of unnamed lepidellas in the Bay Area, as well as these knowns: *Amanita silvicola,* a squat, white, conifer-loving amanita of unknown toxicity, and *Amanita smithiana* (Smith's lepidella), potentially deadly and fortunately rare, with a long rooting stipe. Smith's lepidella becomes more common as you move north along the coast, reaching its population apex in the Pacific Northwest. It has caused a number of serious poisonings when mistaken for the choice, edible, and fluffy white matsutake (*Tricholoma magnivelare)*.

The most common and distinctive Bay Area lepidella is the magnificent *Amanita magniverrucata*. This large and robust form, found under pine, has a fat, rooting stipe and large, persistent conical warts on its cap, almost like stiff peaks of meringue. Unusual among California lepidellas, its warts cannot be readily removed, as they actually arise from the cap tissue itself.

Another curious group of amanitas can be found in section Validae, which contains the "blushing" amanitas: *Amanita rubescens* and *Amanita amerirubescens* from Europe and eastern North America, respectively. The newly named western blusher, *Amanita novinupta*, was once uncomfortably lumped with *Amanita rubescens*. Distinctive differences between these two mushrooms led Tulloss and Lindgren to publish *Amanita novinupta* as a separate species in 1994.

Amanita novinupta is a generally robust but sometimes quite slender, white amanita found under coast live oak in the late winter and spring. Its white coloration is ephemeral, with all parts changing slowly with age and handling to a ruddy red. The western blusher has a pendulous annulus and an expanded stipe base, sometimes without visible universal veil remnants and sometimes forming a close cup. Its cap can be covered with low, reddening warts. Like its eastern and European relatives, it is a choice edible, but it should be cooked well. Hemolytic toxins that may be present in the raw mushrooms are destroyed by heat.

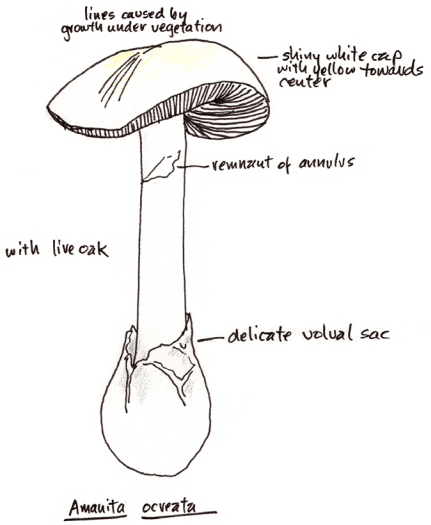
Also found within section Validae but rarely reddening is the yellow-veil amanita (*Amanita franchetii* sensu Thiers). This is a striking mushroom with a sometimes umbonate cap, in shades of brilliant yellow to darkest brown and combinations thereof. These mushrooms appear under pines throughout



Amanita franchetii

our rainy season. The yellow universal veil remains as warts on the cap (which can fade in brilliance) and as friable bits of bright yellow tissue along the slightly expanded stipe base. *Amanita franchetii* has a pendulous annulus, often trimmed with yellow. The California *franchetii* is not the same as the original European form and will eventually get its own name.

And finally we come to the unambiguously poisonous, deadly duo of *Amanitas* in section Phalloideae, the ones that give all amanitas a bad name: the destroying angel (*Amanita ocreata)* and the death cap (*Amanita phalloides)*. Both o*creata* and *phalloides* contain deadly amatoxins, which are not water soluble and cannot be removed from the mushroom flesh by any means. These two species are why the eating of amanitas should never be undertaken lightly, and for most, never attempted at all.



Amanita ocreata

Amanita ocreata is an uncommon, primarily white species found with coast live oak during winter and spring. Its bald white cap can sometimes be colored tan or brown or yellow in the center. It has a pendulous annulus (which can be lost) and a large, saccate volva that covers the bulbous base. Our western destroying angel is often far more squat and robust than those found in Europe and on the East Coast, but slender versions also occur.

Amanita phalloides, the most common cause of fatal mushroom poisoning in California and the world, is an unfortunate, inadvertent transplant to our shores. Introduced and highly invasive, it was brought into California on the roots of ornamental trees as early as 1938 and found our native oak woodlands much to its liking. It is currently widespread across the state, occurring wherever live oak is found, and it has been collected in all seasons here in the Bay Area. First documented under Monterey pine in Marin County in 2008, it may be expanding its local mycorrhizal associates from oaks to conifers.

Amanita phalloides can fruit in great numbers and, as an invasive species, may be able to outcompete native mushrooms or even "cheat" its host tree. Dr. Anne Pringle and her student Benjamin Wolfe of Harvard University are currently researching this theory by looking at carbon and nitrogen exchanges in mycorrhizal root tips.

Amanita phalloides

Death caps are handsome mushrooms that can tempt the unwary forager. The classic cap color is greenish-yellow, but it can also be brown or tan or rarely white, and sometimes takes on a metallic sheen with age. *Amanita phalloides* usually has a bald cap without striations, a pendulous partial veil, which can be lost, and a saccate volva hugging a bulbous base, but beware—features on any amanita can vary. Its odor runs from sweet in youth to foul in age. Those who have eaten this mushroom call it delicious.

Obviously, eating amanitas can be fraught with danger, but there is no risk in ardent admiration or casual handling. Look for these beautiful and useful members of our local mycoflora the next time you walk the wet Bay Area woods.

For more information on this interesting genus, please visit the website of the Bay Area Mycological Society (BAMS): www.bayareamushrooms.org
and Dr. Tulloss' Amanita Studies website: http://pluto.njcc.com/~ret/amanita/mainaman.html

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