Trial Key to species of **MARASMIOID fungi** in the Pacific Northwest

Prepared for the Pacific Northwest Key Council

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Minor Revision by Ian Gibson, 2019

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MINOR REVIEW 2019

As a result of research since 2005, the following name changes have been proposed

*Marasmius alliaceus -> Mycetinis alliaceus*

*Marasmius copelandii -> Mycetinis copelandii*

*Marasmius salalis -> Mycetinis salalis*

*Marasmius scorodonius -> Mycetinis scorodonius*

*Marasmius androsaceus* -> *Gymnopus androsaceus*

*Marasmius quercophilus* -> *Gymnopus quercophilus*

*Micromphale perforans* -> *Gymnopus perforans*

*Micromphale sequoiae* -> *Gymnopus sequoiae*

In addition, it has been proposed that *Marasmius chordalis* is a synonym of the species known either as *Marasmius undatus* or *Rhizomarasmius undatus*, in place of the view that *M. undatus* is a synonym of *M. chordalis* as suggested in the key, or the view that they are different species.

As none of the new current names are universally accepted yet, the key has not been changed.

INTRODUCTION

This key was inspired by Mariana Bornholdt’s earlier contribution to the keys of the Pacific Northwest Key Council (Bornholdt, 1983). Since her work included only species in the genera *Marasmius* and *Marasmiellus*, and because there has been considerable advance in our knowledge of marasmioid species in the Pacific Northwest, particularly with the contributions by Denis Desjardin and Scott Redhead, an entirely new key was required.

Unfortunately for field workers, most marasmioid fungi are identified taxonomically primarily on the basis of microscopic features, and the best way to solidly identify them is to use the keys in a monograph such as those published by Desjardin (1987) or Gilliam (1976). Microscopes are frequently unavailable, however; thus, this field key. While I sincerely hope that it will be useful for fieldworkers, users of this key should consider their identifications provisional until confirmed or corrected with the help of one of the keys mentioned. That said, after some practice with marasmioid fungi, many can be identified pretty well macroscopically.

What is a marasmioid fungus? To paraphrase former U. S. Supreme Court Justice Potter Stewart, it might be difficult to give a foolproof description, but “I know it when I see it,” and after a little experience, marasmioid fungi can be easily recognized in the field. Marasmioid fungi are small, white-spored decomposers (rarely parasites) with tough sporocarps, especially in the stipe. Fries originally defined the genus *Marasmius* as being “marcescent,” that is, reviving if moistened after having been dried. The revival is visually obvious – the mushroom resumes its fresh appearance, more or less. Biologically, marcescent sporocarps often resume spore production, a handy adaptation for small, thin-fleshed fungi which otherwise might perish in a dry spell before shedding spores. I have observed and measured this phenomenon in *Gymnopus subnudus*, but am unaware of any studies which have compared the abilities of different marcescent fungi to revive over time. In any case, one need not perform a test for marcescence to recognize a marasmioid fungus; its general appearance is usually sufficient.

Marasmioid fungi lack partial and universal veils. Pilei are never viscid, and they tend to be convex to plane with uplifted margins, rather than conical or papillate (e.g, *Mycena*). Gill attachment is variable, but never decurrent (e.g, *Clitocybe*). Usually, gills are adnate or adnexed; sometimes they are free or attached to a free collar (a “collarium”). Stipes are distinctively tough, rarely crushed by even a good squeeze. They are usually pale above and darken below, either with or without a velvety appearance. It is important to pay attention to the stipe base, which may be attached squarely to the substrate without any evidence of basal mycelium (a condition known as “insititious”), or there may be abundant fuzzy mycelium. The stipe may also continue deep into the substrate where it may originate from a buried cone – an important characteristic, if noted. With few exceptions, marasmioid fungi vary from white, through shades of pale yellow brown, to dark reddish brown, to black. A very few are purplish, and a few are burgundy-red. Generally, marasmioid fungi are simply small, tough, little brown mushrooms.

NOTES ABOUT THIS KEY

No marasmoid fungi are viscid or have universal or partial veils, so these characters are not mentioned in the descriptions. All spores are thin walled, smooth, and inamyloid unless stated otherwise.

The major characters which comprise the backbone of this key are HABITAT, ODOR, and SIZE. It will be very difficult to use this key unless these characters are known.

HABITAT

Marasmioid fungi in the Pacific Northwest demonstrate a high degree of habitat specificity. Accordingly, noting substrate is extremely important in identifying marasmioid fungi and using this key. Several species are found exclusively on cones of Douglas fir and other gymnosperms; others are specific for coniferous detritus, and others may be found only on leaves of particular deciduous species (e.g., salal, rushes, oak, etc.). A few are noted vaguely on “coniferous detritus,” and the habitat for some (e.g., *Strobilurus albipilatus*) is not clear, since different authors provide different substrates. There is still room for discovery in this group, so please take detailed notes of your collections of marasmioid fungi.

ODOR

Marasmioid fungi are notable for frequently smelling and/or tasting like garlic or onions. This characteristic is called “alliaceous.” Odor intensity ranges from very strong to faint, and since people vary widely in their perception of odor, the key works for alliaceous fungi even if the odor is unknown. It works better if odor is known, so be sure to carefully note odors AND tastes on fresh sporocarps. Some species have an unpleasant “putrid water” odor, which, if present, is particularly useful for identification. Many marasmioid fungi are NOT alliaceous.

SIZE

Marasmioid fungi are small, usually with pilei less than a couple of centimeters wide (measured straight from side to side, not curving over the top). Some are extremely small, only a few millimeters wide, and are thus probably more frequently overlooked than most other agarics. Size is an important characteristic in this key, forming the basis for an important key branch (key step 17). To use this key successfully, it will be necessary to distinguish among the following: pilei averaging less than 1 centimeter in diameter, pilei averaging between one and two centimeters in diameter, and pilei averaging more than 2 centimeters in diameter.

A ruler, and a good eye, and a good nose are important tools for successful use of this key.

VOCABULARY

A basic knowledge of mycological terminology is assumed here. The terms in the following list are even more rarified than usual, but very important in understanding marasmioid fungi.

**alliaceous** – smelling or tasting like garlic or onion.

**appendiculate** – margin of pileus fringed.

**amyloid** - staining blue following treatment with Melzer’s solution.

**broom** **cells** – cells, usually in the pileipellis or sometimes on hymenium, with numerous short rod-like projections.

**collarium** – a collar-like tissue to which lamellae of some species attach near the stipe; frequently the collarium is free from the stipe.

**dextrinoid** – staining yellowish-brown or reddish-brown in the presence of Melzer’s solution

**diverticulate** – usually of cells in the pileipellis, caulopellis, and hymenium, diverticulate cells have numerous peg- or rod-like appendages or longer branches scattered across their surface, often only on the cell ends.

**hymeniform** – a type of pileipellis in which the cells are anticlinal, or perpendicular to the surface, and thus similar to the arrangement of basidia in the hymenium.

**insititious** – a stipe which is squarely attached to its substrate without the appearance of mycelium.

**marcescent** – a sporocarp which, after drying, revives to near its original form after rehydration, and which may resume spore production.

**pileipellis** – the outermost layer of cells of the pileus, excluding the veils (if present). Synonymous with the term “cuticle.”

**ramealis** structure - a type of pileipellis in which the cells are more or less periclinal (parallel to the surface) but which have short vertical branches. The branches may be long or quite short (see “diverticulate”).

**rhizomorphs** – root-like hyphal strands, usually dark-colored in marasmioid fungi, which seem to bind together substrates and may also serve to transport nutrients and colonize new substrates.

**sterile stipe** – a stipe without a cap.

**subinsititious** – Almost insititious but with a small amount of basal mycelium visible.

TAXONOMY

Deciding which genera to include in this key was difficult, but for consistency’s sake I follow the example of Desjardin (1987), who included as marasmioid fungi the genera *Baeospora*, *Crinipellis*, *Marasmiellus*, *Marasmius*, *Micromphale*, and *Strobilurus*. Short descriptions of these genera follow. A few other genera, such as *Xeromphalina*, *Omphalina*, *Mycena* and *Gymnopus* might at times be considered marasmioid. *Xeromphalina* and *Omphalina* have broadly adnate to decurrent gills, so if your collection has decurrent gills, don’t use this key. Mycenas tend to have more conical or campanulate caps and are almost all more fragile than marasmioid fungi, a characteristic one gets used to with practice. As a rule of thumb, marasmioid fungi usually survive transport in a waxed bag, whereas mycenas do not. Although some members of *Gymnopus* are marcescent and otherwise marasmioid, most are larger than 2 cm, so if you have difficulty keying out a marasmoid fungus and it is 2 cm or larger, try the *Gymnopus* key.

The source for the following descriptions of genera included in this key is primarily Largent and Baroni (1988).

*Baeospora*

Spores small and amyloid; all the rest of the genera in this key have inamyloid spores.

Lamellae densely crowded. If you are not sure whether your sporocarp has densely crowded gills or not, then it does not. This is a very distinctive character when observed.

Two species only occur in our area. *Baeospora myosura* occurs on cones and is easily keyed out; *B. myriadophylla* has distinctive lilac tints and is keyed out that way.

*Crinipellis*

Pileus covered with long, often densely packed, dextrinoid or amyloid fibrillose hairs, margin often appendiculate with these hairs.

Spores are inamyloid.

*Marasmiellus* and *Marasmius*

Currently, the status of *Marasmiellus* is uncertain due to recent studies using molecular methods combined with classical taxonomy and systematics. Uncertain taxonomic position is nothing new with *Marasmiellus*, which has a long and sordid taxonomic history. It is retained here provisionally until time and more research sort things out.

Briefly, these two genera are very similar. Macroscopically, the best distinguishing characteristic is the insititious (or sub-insititious) stipe of *Marasmiellus*…although some species of *Marasmius* may have an insititious stipe also (in which case, please refer to the previous paragraph). Microscopically, *Marasmiellus* has a ramealis-type structure on the pileipellis and/or stipitipellis while the pileipellis of Marasmius (usually) is hymeniform. *Marasmiellus* lacks any dextrinoid tissue.

The core genus of this key, *Marasmius* has long been recognized by its marcescent habit. The stipe may be either very thin, tough and black (horse-hair like, bristle-like) or thicker; if thicker, it is typically pallid at the apex and darker below.

What these fungi may lack in stature and brilliant colors, they make up in microscopic features. The cells in the cap and gills are often quite distinctive and worth looking at. They also are highly informative taxonomically, and although this is a field key, I have included some microscopic features for those up to the challenge. The structure of the pileipellis is very important. Among species of these genera, the pileipellis structure ranges from unbranched or unornamented hymeniform terminal cells to lightly ornamented “broom cells” to highly branched terminal cells. Cystidia, particularly cheilocystidia, show a similar range of variation.

*Micromphale*

*Micromphale* is a marasmioid fungus which usually has a fetid, unpleasant, but NOT alliaceous odor, an insititious and darkly pigmented stipe, and a pileipellis composed of a cutis and with distinctly gelatinized trama.

*Micromphale* was synonymized with *Marasmiellus* by Kühner 1980 and this was accepted by Antonín et al. (1997). However, since Desjardin (1987) maintains *Micromphale*, and because we are in a period of taxonomic upheaval brought about by the revolution in molecular methods (epitomized by Moncalvo et al.’s monumental paper in 2002), I have chosen to keep *Micromphale* a little bit longer.

*Strobilurus*

Very much like *Baeospora*, especially *B. myosura* which is also found on cones. *Strobilurus* however has subdistant to close (but not densely crowded) and relatively broad gills. Pileipellis is hymeniform. Redhead (1980) includes absence of clamp connections as a generic character.

SPECIES INCLUDED

This key is based on species reported in Gibson et al.’s Matchmaker program (2003), which in turn is based on the experiences of many members of the Pacific Northwest Key Council, records in northwestern mycological herbaria, and published reports. A list of species included is provided in Appendix 2.

Most of the descriptions in the key are modified from those published by Denis Desjardin (especially Desjardin (1985, 1987)) and Scott Redhead (especially Redhead (1980, 1981, 1986)); this key would have been nearly impossible without their important contributions.

Some of the species included in this key have been recorded rarely in the Pacific Northwest (e.g., *Baeospora myriadophylla*); some, such as *Marasmius thiersii* and *Marasmius sequoiae*, have been reported only for California, but may stray into similar habitats in southern Oregon. The author would greatly appreciate donations of annotated collections of these species, for they form the basis for scientifically robust descriptions of species ranges.

Species which seem rare may appear so because, in fact, they ARE rare. Alternatively, they may be common but are overlooked because of a diminutive (and relatively drab) stature. Or, possibly, they are both rare and drab. I hope that this key will encourage mushroom collectors to pay more attention to these eminently identifiable fungi, and that they will share information so that we can better understand both the diversity and distribution of marasmioid fungi in the Pacific Northwest.

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REFERENCES

Antonín, V., R. E. Halling, and M. E. Noordeloos. “Generic concepts within the groups of *Marasmius* and *Collybia* sensu lato.” *Mycotaxon* 63:359-368.

Arora, D. 1986. *Mushrooms demystified: a comprehensive guide to the fleshy fungi*. 2nd edition. Ten Speed Press. Berkeley.

Bornholdt, M. 1983. “Trial field key to the species of *Marasmius* and *Marasmiellus* in the Pacific Northwest.” Pacific Northwest Key Council.

Desjardin, D. E. 1985. “New marasmioid fungi from California.” *Mycologia* 77(6): 894-902.

Desjardin, D. E. 1987. “Marasmioid fungi: the genera *Baeospora*, *Crinipellis*, *Marasmiellus*, *Marasmius*, *Micromphale*, and *Strobilurus*.” In: *The Agaricales (Gilled Fungi) of California. 7. Tricholomataceae I.* Mad River Press, Eureka.

Desjardin, D. E. 1997. “A synopsis of *Marasmiellus* in the Southern Appalachian Mountains.” *Mycotaxon* 65: 237-261.

Gibson, I., E. Gibson, and B. Kendrick. 2003. ”Matchmaker: Gilled Mushrooms of the Pacific Northwest.” Ver. 1.10. Copyrighted software.

Gilliam, M. S. 1976. “The genus *Marasmius* in the northeastern United States and adjacent Canada.” *Mycotaxon* 4(1): 1-144.

Kühner, R. 1980. “Les hyménomycètes agaricoides (Agaricales, Tricholomatales, Pluteales, Russulales).” Bull. Soc. Linn. Lyon 49 (num. spéc.): 1-1027.

Largent, D. L., and T. J. Baroni. 1988. *How to Identify Mushrooms to Genus VI: Modern Genera.* Mad River Press, Eureka.

Lennox, Joanne Williams. 1979. “Collybioid Genera in the Pacific Northwest.” *Mycotaxon* 9(1): 117-231.

Moncalvo, J.-M., R. Vilgalys, S. A. Redhead, J. E. Johnson, T. Y. James, M. C. Aime, V. Hofstetter, S. J. W. Verduin, E. Larsson, T. J. Baroni, R. G. Thorn, S. Jacobsson, H. Clemencon, and O. K. Miller Jr. 2002. “One hundred and seventeen clades of euagarics.” *Molecular Phylogenetics and Evolution*. 23:357-400.

Petersen, R. H. 2000. “*Rhizomarasmius*, Gen. Nov. (Xerulaceae, Agaricales).” *Mycotaxon* 65:333-342.

Redhead, S. A. 1980. “The genus *Strobilurus* (Agaricales) in Canada with notes on extralimital species.” *Can. J. Bot*. 58:68-83.

Redhead, S.A. 1981. “Agaricales on wetland Monocotyledonae in Canada.” *Can. J. Bot*. 59: 574-589

Redhead, S. A. 1986. “The genus *Crinipellis* Pat. in Canada.” *Atti del Centro Studi per la Flora Mediterranea* 6:175-199.

Schalkwijk-Barendsen, Helene M.E. 1991. Mushrooms of Western Canada. Lone Pine, Edmonton.

Color code:

On cones

Purple tints

Alliaceous

Minute (pilei average 0-1.0 cm)

Small (pilei average1.0-2.0 cm)

Not very small (pilei average larger than 2.0 cm)

KEY TO MARASMIOID FUNGI

1a Growth consistently on cones of conifers (these may be buried, so look carefully in the field!) 2

(for a discussion of marasmioid species growing on cones, see under *Strobilurus trullisatus*, key step 3b)

1b Growth on other substrates 4

2a (1). Lamellae densely crowded, on cones of spruce (*Picea)*, Douglas fir (*Pseudotsuga*), and very rarely on pine (*Pinus*) *Baeospora myosura*

**REMARKS** Very crowded whitish to beige brownish lamellae and growth on buried conifer cones are diagnostic. Other macroscopic features include small size, light brown pileus, white spore deposit. Distinctive microscopic features include presence of clamps (in contrast to *Strobilurus*, which lacks clamps), very small amyloid spores (less than 5 μm) (in contrast to *Gymnopus*, which never has amyloid spores), and a pileipellis which is a cutis (in contrast to *Marasmius*, which has a cutis usually consisting of a derm).

 **PILEUS** 0.5-2.8cm, convex to somewhat conic, becoming plane, occasionally shallowly umbonate, margin usually remaining inrolled; somewhat hygrophanous, warm buff to honey brown when moist, drying somewhat lighter, especially at margin. **LAMELLAE** adnexed, very narrow and crowded; pallid to light pinkish buff, often mottled with brownish spots. **STIPE** 1.5-5.0cmx0.1-0.2cm, equal or slightly tapered toward base in the upper half; tough; concolorous at top, then darkening to dark buff for most of its length; finely pruinose, appearing almost glabrous when moist, the surface coating more visible on drying, strigose at base; sub-radicating, non-insititious, frequently with white rhizomorphs. **ODOR** and **TASTE** not distinctive.

**MICROSTRUCTURES** spores 3.3-4.2x2.1-2.7 µm, elliptic, colorless, thin-walled, weakly amyloid; pleurocystidia and cheilocystidia present, rather small, 15-24x4-8 μm, broadly clavate, thin-walled, colorless; pileipellis of radially oriented, filamentous hyphae, weakly or non-incrusted. **HABITAT** in the Pacific Northwest, solitary to gregarious on cones of Douglas fir (*Pseudotsuga*) or Sitka spruce (*Picea sitchensis*), these often buried. Elsewhere, on cones of other conifers and *Magnolia*.

2b Lamellae subdistant or close, but not densely crowded 3

3a (2) On cones of spruce (*Picea*) *Strobilurus occidentalis*

See comparison of *S. occidentalis* and *S. trullisatus* at key step 3b.

Features include growth on Sitka spruce cones, small size, buff to brown dry pileus, less crowded lamellae than *B. myosura*, spores that are small, smooth, and inamyloid, and thick-walled pleurocystidia capped with an apical resinous mass.

**PILEUS** 0.3-1.6cm, convex, at times somewhat umbonate, becoming plano-convex; deep yellow brown to dark yellow brown or vinaceous buff, hazel or grayish sepia; dry, smooth to rugulose, margin striate in age. **LAMELLAE** adnate to adnexed, close to subdistant, moderately broad; white. **STIPE** 1-5x0.1-0.2cm, equal, root-like pseudorhiza usually present; stipe apex white, darkening below to brownish orange; top pruinose, mid-part pubescent, base tomentose, covered with downy, orange or ochraceous mycelium. **ODOR** **and** **TASTE** not distinctive. **HABITAT** usually associated with cones or cone scales, sometimes on needles or stems (but look carefully since often the cones are buried). The primary conifer associates is Sitka spruce (*Picea sitchensis*), but these have also been reported: white spruce (*Picea glauca*), pine (*Pinus*) and Douglas fir (*Pseudotsuga menziesii*). Leaves and stems of poplar (*Populus*) have been reported by one source (Schalkwijk-Barendsen, 1991). Forest habitats include coastal Sitka spruce (*Picea sitchensis*) forests, coastal flood plains, and boreal and subalpine forests. They may be found in fall or early spring, sometimes associated with melting snowbanks.

**MICROSTRUCTURES** spores 4-6x2-3 μm, elliptic to cylindric; pleurocystidia 33-45x9.6-14.4 μm, obclavate or fusoid-ventricose, rarely subcapitate, capped with a large, globose, granular and resinous mass, walls 1-3 μm thick, cheilocystidia abundant, like pleurocystidia but narrower and lacking the apical resinous mass, and with thinner walls up to 1 μm thick; pileipellis hymeniform; clamp connections absent in all tissues.

3b On cones of Douglas fir (*Pseudotsuga menziesii*) *Strobilurus trullisatus*

Features of *S. trullisatus* include small size, white to pinkish-buff pileus, growth exclusively on cones, usually of Douglas fir (*Pseudotsuga menziesii*), spores that are small, smooth, and inamyloid, and pleurocystidia with an apical resinous mass that ruptures to leave an apical collarette.

The habitat of *S. occidentalis* and *S. trullisatus* sometimes overlap. While S. *trullisatus* is usually on Douglas fir cones, it is sometimes found on spruce cones according to Arora (1986), and both can be found sometimes on pine cones. The two can be distinguished macroscopically by the darker pileus (buff to brown) of *S. occidentalis* and the white to pinkish-buff pileus of *S*. *trullisatus*.

The genus *Strobilurus* is distinctive microscopically by its hymeniform pileipellis, inamyloid spores and absence of clamp connections. *Strobilurus occidentalis* has thick-walled (1-3 µm) pleurocystidia capped by a large resinous mass; *S. trullisatus* has thinner-walled (less than 1 µm) pleurocystidia which may also have a resinous cap, but this is membrane-bound and the rupture of the membrane may leave a distinctive apical collar.

A third species of *Strobilurus* occurs in higher elevations in the Pacific Northwest: *S. albipilatus* (Key step 37). *Strobilurus albipilatus* however does NOT occur on cones, but rather on debris and decayed wood of fir (*Abies*), pine (*Pinus*), Douglas fir (*Pseudotsuga menziesii*), and also birch (*Betula*). Its pleurocystidia only rarely have the resinous mass present on the pleurocystidia of *S. occidentalis* and *S. trullisatus.*

*Baeospora myosura* is also found on cones, but is differentiated by its 1) slightly larger size, 2) densely crowded lamellae, 3) weakly amyloid spores, 4) pleurocystidia that lack apical collarettes, 5) hyphae with clamp connections, and 6) pileus cuticle composed of repent, radially oriented filamentous hyphae.

**PILEUS** 0.5-2cm, convex to plane, becoming depressed when old; somewhat hygrophanous, disc light brown, brownish orange, or orange-white when young, margin pinkish white; glabrous, smooth or somewhat wrinkled, translucent-striate. **LAMELLAE** adnexed, close; white, pale yellowish white or pinkish white. **STIPE** 2-5cmx0.1-0.2cm, equal, cartilaginous; top white, lower part yellowish to brownish or tawny; top pruinose, mid-part pubescent, base tomentose, covered with downy, orange mycelium; root-like pseudorhiza usually present. **ODOR and TASTE** not distinctive. **HABITAT** usually on old, sometimes buried cones of Douglas fir (*Pseudotsuga menziesii*) or rarely cones of other conifers.

**MICROSTRUCTURES** spores 3-5.7x1.5-3.5 μm, elliptic or narrowly almond-shaped, inamyloid; pleurocystidia and cheilocystidia abundant, rarely scattered, usually with a massive apical resinous to finely granular mass bound by a thin membrane which ruptures in mounts to leave an apical collarette; pileus cuticle hymeniform.

4a (1) Pileus with distinctive purple/violet tints in pileus and lamellae *Baeospora myriadophylla*

Features include small size, lavender to mauve pileus, close to crowded lilac-tinted lamellae, stipe with long coarse hairs at base, growth on rotten wood, white spore deposit, and small amyloid spores; uncommon.

*Baeospora myriadophylla* occurs on rotting wood – in CA in higher elevations on fir (*Abies*), in other areas of the Northwest on poplar (*Populus*) and Hemlock (*Tsuga*) in lowland mixed woods. Most notably, it does NOT favor cones. It thus resembles lignicolous mycenas, especially the lavender/lilac *Mycena pura* complex, from which it can be distinguished by its densely crowded lamellae and convex/plano-convex pileus (*Mycenas* have conical pilei when young); it also resembles *Chromosera cyanophylla*, which has distinctly decurrent lamellae and a viscid pileus.

**PILEUS** 0.9-2.5cm, convex when young, nearly plane with a shallow central depression when old, rarely with a small, obtuse, central papilla; hygrophanous, disc grayish purple to dull violet when young, violet-brown or grayish brown when old; glabrous. **LAMELLAE** adnate or slightly adnexed, extremely crowded, lamellae narrow; grayish purple or dull violet when young, becoming paler when old. **STIPE** 2.0-5.5cmx0.15-0.4cm, equal, round in cross-section or compressed and cleft, not insititious; top pale reddish gray when young, grayish purple when old, base grayish purple or dull violet when young, grayish brown or brown when old; top minutely pruinose, glabrescent, base pubescent or tomentose, the tomentum white or pale lavender. **ODOR** strongly fungal. **TASTE** mild. **HABITAT** scattered to caespitose on decayed wood, reported on fir (*Abies*), poplar (*Populus*) and hemlock (*Tsuga*).

**MICROSTRUCTURES** spores 2.5-4.2(4.5)x2-3 μm, nearly round or elliptic, weakly amyloid; pleurocystidia and cheilocystidia present, broadly clavate or ventricose; basidia, basidioles, and cystidia with thick, globular, brown, weakly dextrinoid pigment incrustations appressed to the basal portion of the cells.

4b Lacking purple/violet tints 5

5a (4) Pileus size ranging 0.5-2.4cm, soft and fragile and not reviving, buff to dark brown, common (in CA) in high-elevation forests among debris and wood of fir (*Abies*) and pine (*Pinus*)

 *Strobilurus albipilatus*.

 see key step 38a

This species is difficult to key out macroscopically, as its most conspicuous definitive features are microscopic (in fact, it hardly qualifies as a marasmioid fungus to begin with, but is included here because of its affiliations). There is some disagreement in the literature on whether or not it occurs on Douglas fir cones. See discussion of *Strobilurus* species on key step 3b.

5b Not as above 6

6a (5)Odor when crushed and/or taste of garlic or onion (alliaceous), or of putrid water 7

6b Odor and taste mild 16

***A quick guide to odoriferous marasmioid fungi.***

***If it doesn’t smell much, but tastes mildly garlicky, and it’s on the needles of coast redwood (*Sequoia sempervirens*), it’s* Micromphale sequoiae*. This would be a notable find for the PNW and the author would appreciate notification (and a specimen).***

***If it smells like garlic (alliaceous), and if it’s EXTREMELY small (0.1 – 0.25cm), on fallen needles of conifers, it’s* Marasmiellus filopes*.***

***If it smells bad, like putrid water, and it’s on conifer needles, it’s* Micromphale perforans*. This would be a notable find for the PNW and the author would appreciate notification (and a specimen).***

***If it smells like garlic (alliaceous), and if it’s on conifer needles, has pilei 0.4 – 2.0cm, has a glabrous stipe, you may have* M. scorodonius*, but this would be quite a find, as in CA at least it has been found only once, in Humboldt County. Compare carefully with* M. copelandii*. This would be a notable find for the PNW and the author would appreciate notification (and a specimen).***

***If it smells like garlic (alliaceous), and if it’s less than one cm broad, and on pine (*Pinus*) needles or tanbark oak leaves (*Lithocarpus densiflora*), it may be* Marasmius thiersii*, which would be a rare find worth reporting. Check its microscopic characteristics against that of* Marasmius copelandii*, a common alliaceous mushroom in CA.* Marasmius copelandii *is most often on oak (*Quercus spp*.), chinkapin (*Castanopsis chrysophylla) *and tanbark oak (*Lithocarpus densiflora*). It tends to be larger than* M. thiersii *and has distinctive microscopic features.***

***If it smells like garlic (alliaceous), if its pileus is 1.0-1.8cm, if it’s on coniferous detritus, and if it’s densely gregarious to subcaespitose, it may be M. applanatipes.***

***If it smells like garlic (alliaceous), and if it’s on leaves of salal (*Gaultheria shalon*) or Oregon grape (*Berberis aquifolium*) , it’s* Marasmius salalis*. This is one of the most common alliaceous marasmioid fungi the British Columbia, according to Ian Gibson.***

***If it smells like garlic (alliaceous), and if it’s on the bark of madrone (*Arbutus menziesii*), it’s* Micromphale arbuticola*. This would be a notable find for the PNW and the author would appreciate notification (and a specimen).***

***If it smells like garlic (alliaceous), if its pileus is (0.8)1-2.4(3.5)cm wide, if it’s on leaves of oak (*Quercus spp*.), chinkapin (*Castanopsis chrysophylla) *, and/or tanbark oak (*Lithocarpus densiflora*), and if it has a minutely hairy stipe, it’s probably* Marasmius copelandii *(“the most commonly collected alliaceous marasmioid fungus in California” (Desjardin 1987)).***

7a (6) On coniferous detritus (leaves, needles, cones, wood, etc.) 8

7b On other substrates (usually leaves of hardwoods) 13

8a (7) On fallen leaves of coast redwood (*Sequoia sempervirens*); odor mild and taste only latently alliaceous *Micromphale sequoiae*

Not yet listed for Oregon, this species should occur under redwood in the extreme southwest of the state. Additional features include an orange or brown pubescent, insititious stipe, a light brown rugulose pileus, a pileipellis composed of repent hyphae embedded in a gelatinous matrix (a characteristic of the genus *Micromphale*, but see Antonín et al., 1997), and the presence of cheilocystidia (which separate it from *Micromphale arbuticola*). Linguistic features include a sequence of all 5 vowels together.

**SIMILAR** species include *Micromphale perforans* (strong odor, on needles of spruce and fir, paler pileus, black stipe), and *Marasmius androsaceus* and *M. pallidocephalus* (black, smooth, bristly stipes).

**PILEUS** 0.6-1.2cm broad, convex becoming plane, sometimes with a central papilla; hygrophanous; light brown to reddish brown, fading to brownish orange in age; rugulose. **LAMELLAE** adnate, close to subdistant, rarely anastomosing or intervenose, concolorous with the pileus margin at maturity. **STIPE** 2.0-4.3x.075-.15cm, insititious; apex brownish-orange darkening toward base to dark brown; apex pruinose, middle part pubescent, base furfuraceous; black rhizomorphs occasionally present. **ODOR** mild or rarely slightly fetid when old and wet. **TASTE** strongly alliaceous after 1-2 minutes. **HABITAT** on stem and leaves of coastal redwood (*Sequoia sempervirens*).

**MICROSTRUCTURES** spores 6.5-7.5x3-3.7 µm. Cheilocystidia and pleurocystidia abundant, cylindric or ventricose. Pileus cuticle of repent, interwoven, non-diverticulate hyphae embedded in a gelatinous matrix.

8b Odor stronger and/or habitat different 9

9a (8) Pileus extremely small (0.1-0.25cm), pinkish buff to pale brownish gray; stipe pallid, pruinose, and insititious; on fallen leaves of conifers *Marasmiellus filopes*

**NOTES** recognized by minute pinkish buff or pale brownish gray pileus, pallid pruinose stipe insititious on needles of conifers, mild alliaceous odor, lack of rhizomorphs; also has diverticulate hyphae on stipe and pileus.

**PILEUS** 0.05-0.25cm, convex to slightly umbonate; occasionally nearly white, more often pinkish buff or brownish gray; dry, opaque, glabrous or slightly powdery, often finely wrinkled, striate, and/or grooved. **LAMELLAE** adnate to adnexed, distant, occasionally somewhat fold-like, broad, not forked or interveined; colored as pileus or paler. **STIPE** 0.5-1.5cmx0.01-0.05cm, thread-like, insititious, somewhat wiry but not bristle-like; buff to nearly white, usually slightly darker basally; minutely pruinose overall; no rhizomorphs but rhizomorph-like sterile stipes abundant. **ODOR and TASTE** mildly alliaceous or absent. **HABITAT** in troops often numbering hundreds or thousands on coniferous needle beds with each individual fruiting body on a single needle. Hosts include fir (*Abies*), pine (*Pinus*), spruce (*Picea*) and hemlock (*Tsuga*).

**MICROSTRUCTURES** spores 6.6-11x3-4.2μm, elliptic, almond-shaped, or tear-shaped; pleurocystidia absent, cheilocystidia scattered, often rare, densely diverticulate; pileipellis a tangled mat of suberect to repent hyphae incrusted or unevenly thickened, hyphal ends densely diverticulate; hyphae on stipe surface densely diverticulate.

9b Pileus usually larger 10

10a (9) Pileus 0.8-1.2cm, odor of putrid water instead of alliaceous; on conifer needles *Micromphale perforans*

**NOTES** features include small size, whitish to pinkish brown grooved pileus, adnate whitish to pileus-colored lamellae, tough brown to blackish velvety stipe that is pinkish to ochraceous at top, strong odor of putrid water, and growth on individual conifer needles. The occurrence of this species in the PNW is not certain. Please send collections of this species to the author. Similar: *Marasmius thiersii* (alliaceous odor, pileus darker, stipe wider and apically darker, larger spores and stipe tramal hyphae dextrinoid); *M. applanatipes* (near-caespitose clusters and with a compressed stipe); *M. androsaceus* (odorless, with a horsehair-like stipe and rhizomorphs similar in appearance to stipe).

**PILEUS** 0.8-1.7cm, convex to plane, center depressed; flesh-brown when moist, beige to nearly white when dry; wrinkled or radially furrowed in age. **LAMELLAE** adnate, close to subdistant, interveined, often appearing to be attached to a collarium; white to light beige to flesh-colored. **STIPE** 1.3-3x0.05-0.12cm; pinkish at the top, shining black below; velvety. **ODOR and TASTE** unpleasant, like putrid water with alliaceous undertones. **HABITAT** insititious on needles of spruce (*Picea*) and fir (*Abies*), usually one or two sporocarps per needle.

**MICROSTRUCTURES** spores 5.5-8x2.8-4 μm, elliptic to tear-shaped; pleurocystidia and cheilocystidia present.

10b Not as above 11

11a (10) Stipe glabrous, not apically compressed or cleft *Marasmius scorodonius*

**NOTES** features include pileus 0.4-2.0cm, light brown or brownish orange, radially wrinkled; lamellae narrow, adnate or adnexed, whitish; stipe glabrous and subinsititious; on coniferous detritus. Microscopic features include spores 7.8-9x3.3-4.2 μm (compare to *M. copelandii*, which has spores 13.2-17.1x3-3.9 μm) and diverticulate cheilocystidia. Distribution in Pacific Northwest is uncertain due to confusion with other garlic *Marasmius* species, particularly *M. copelandii*; in CA Desjardin (1987) reports only a single collection of *M. scorodonius* in a grassy area in a coastal spruce-hemlock forest in Humboldt County. Please report findings of this species to the author.

**SIMILAR** like others with garlic odor: *M. salalis* (pubescent stipe, on salal or Oregon grape, much longer spores), *M. copelandii* (pubescent non-insititious stipe, growing on leaves especially oak, much longer spores), *M. alliaceus* (somewhat pubescent stipe, longer spores), *Marasmiellus filopes* (minute pileus, minutely pruinose stipe, insititious on needles)

**PILEUS** 0.4-2.0cm, convex becoming plane; brown or light brown; glabrous, smooth or minutely wrinkled. **LAMELLAE** adnate to adnexed, close to subdistant, narrow, occasionally forked or interveined; white or pale yellowish white. **STIPE** 2-6x0.05-0.2cm, equal, tough, subinsititious; apex brownish orange or paler, darkening below to brown, reddish brown or dark reddish brown; often shiny, glabrous. **ODOR and TASTE** alliaceous. HABITAT scattered to gregarious on coniferous debris and dead fern stems.

**MICROSTRUCTURES** spores 7.8-9x3.3-4.2 μm, elliptic or tear-shaped; cheilocystidia diverticulate.

11b Stipe pruinose, velutinous, or tomentose, but NOT glabrous 12

12a (11) Stipe base insititious; sporocarps scattered to gregarious; pileus sizes 0.5-1.0cm *Marasmius thiersii*

**NOTES** features include pileus dark reddish brown; stipe dark brown, minutely velutinous, and compressed or cleft; it has been reported BOTH on pine needles or senescent leaves of tanbark oak(*Lithocarpus*); montane. Microscopic characteristics include absence of hymenial cystidia and spores 8.1-9x3.3-4.2 μm.

Recorded only in Amador and Yuba counties of northern CA, this species is included here because of the possibility of its occurrence in similar habitats in southern Oregon.

**SIMILAR** to *Micromphale perforans*, which smells of putrid-water rather than of garlic and has a lighter colored stipe and shorter spores (5.5-8 μm); to *M. applanatipes*, which is larger, grows in near-caespitose clusters, and has wider spores (4.8-6.0 μm), and to *Marasmius androsaceus*, which lacks a garlic odor and has a narrow, glabrous “horsehair” stipe.

**PILEUS** 0.5-1.0cm broad, convex or plano-convex, glabrous; dark reddish brown to dark brown; rugulose to rugulose-striate. **LAMELLAE** adnate or adnexed, close, not forked or intervenose, buff to grayish brown. **STIPE** 2.5-4.5x0.1-0.3 mm, compressed and often cleft, narrowed downward, often with a small, knob-like base, insititious; dark brown above, black below; apex pruinose, becoming velvety below; rhizomorphs rare or absent, black. **ODOR** mild or slightly fetid when old and wet. **TASTE** slowly becoming strongly alliaceous. **HABITAT** on senescent leaves of pine (*Pinus*), occasionally on leaves of tanoak (*Lithocarpus*). Montane.

**MICROSTRUCTURES** spores (7.2)8.1-9x3.3-4.2 μm, ellipsoid. Cheilocystidia and pleurocystidia absent. Pileipellis hyphae repent, diverticulate, smooth or incrusted, pigmented areas dextrinoid.

12b Stipe base tomentose, not insititious; sporocarps densely gregarious to subcaespitose; pileus sizes 1.0-1.8cm *Marasmius applanatipes*

**NOTES** Pileus reddish brown to grayish orange, stipe velvety, compressed and cleft, bicolored, with strong alliaceous odor and taste. Microscopic features include bifid cheilocystidia, almond-shaped spores, and no pleurocystidia.

**SIMILAR** to *M. epidryas* (key step 27a), which lacks an alliaceous odor and taste, has pleurocystidia, and is restricted to growth on *Dryas* spp.

**PILEUS** 1.0-1.8cm broad, convex to plane, glabrous, even or rugulose-striate; dark reddish brown fading to dark to light brown to pinkish buff on the margin. **LAMELLAE** adnate to adnexed, subdistant to distant, buff to orange-white when young, darkening in age. **STIPE** 3.0-4.0x0.15-0.4 cm, compressed and often cleft in age, narrowed downward, non-insititious; orange-white above, becoming dark reddish brown below; apex pubescent, base velvety or tomentose. **ODOR and TASTE** strongly alliaceous. **HABITAT** densely gregarious to subcaespitose in duff under mixed conifers (mainly Douglas fir (*Pseudotsuga*), fir (*Abies*), and pine (*Pinus*)) at high elevations.

**MICROSTRUCTURES** spores 8.7-10.2x4.8-6 µm. Pleurocystidia absent; cheilocystidia bifid (forked once near the tips).

13a (7) On dead, fallen leaves of salal (*Gaultheria shallon*) or Oregon grape (*Berberis aquifolium*) *Marasmius salalis*

**NOTES** odor and occurrence on dead leaves of salal and Oregon grape are diagnostic features. Additional features include buff striate pileus 1.2-1.6 cm, adnate whitish to buff lamellae, tomentose stipe that is white at top and dark red-brown below, and elongate spores 15.0-19.2x3.2-5.1 µm. Very **similar** to *M. copelandii*, which occurs on oak leaves and has shorter spores. According to I. Gibson (pers. comm.), this is the most common alliaceous marasmioid fungus collected in British Columbia.

**PILEUS** 1.2-1.6cm, convex to plane-convex; buff, margin radially furrowed in age, translucent-striate, often scalloped. **LAMELLAE** adnate; whitish to buff on faces, paler on edges; crenulate on edges. **STIPE** 3.3-4.6x0.1-0.3cm, equal or with a slightly swollen base, insititious; nearly white at apex, dark brick to chestnut below; sparsely to densely tomentose, being densest at the base; rhizomorphs scattered, short, 0.2-0.4cm long, and tapering apically, with tomentum similar to that on the stipe. **ODOR and TASTE** strongly alliaceous. **HABITAT** on senescent leaves and branches of salal (*Gaultheria shallon*) and Oregon grape (*Mahonia nervosa*).

**MICROSTRUCTURES** spores 15-19.2x3.2-5.1 µm, narrowly pip-shaped to scimitar-like in profile; cheilocystidia with finger-like projections; pileipellis a continuous layer of cystidia-like cells, the cells clavate, usually with a few to many finger-like projections; hyphae on stipe surface with brownish walls which become greenish gray in KOH solution and bear bluish green crystalline plaques especially near stipe base.

13b Not as above 14

14a (13) On scale bark of madrone (*Arbutus*) *Micromphale arbuticola*

**NOTES** pileus 0.4-0.9cm, dark brown, sulcate; stipe minutely pruinose and insititious; taste alliaceous. Microscopic characters include weakly gelatinized hyphae in pileipellis and in trama of pileus and lamellae. Similar to the eastern *Micromphale foetidum*, which is larger (1.5-3.0cm broad), has a paler, more velvety stipe, longer spores, and occurs on different substrates.

Not yet reported from the PNW, this species is included because of the likelihood of its occurrence here, since the range of madrone extends to southern British Columbia. Please report findings of this species to the author.

**PILEUS** 0.4-0.9cm broad, hemispheric, expanding to plane or plane-depressed with a small, central papilla in age; surface glabrous when young, becoming granulose overall in age; disc dark brown, in age may be covered by grayish cream or whitish granules, margin smooth or sulcate, becoming rugulose-sulcate, and wavy in age. **LAMELLAE** adnate or short-decurrent, close or subdistant, rarely forked and intervenose, buff to pale brownish orange. **STIPE** 0.5-1.0x0.075-0.125cm, terete, evenly tapered downward, base insititious, glabrous or minutely pruinose overall; brown above, dark brown or black below; rhizomorphs absent. **ODOR** strongly alliaceous when crushed, **TASTE** alliaceous. **HABITAT** densely gregarious on the scale bark of madrone (*Arbutus menziesii*). It is commonly collected in coastal mixed pine and madrone woodlands, often growing in zones that completely encircle the tree base.

**MICROSTRUCTURES** spores 6.9-8.1(9)x3.3-4.2 µm, ellipsoid. No pleuro- or cheilocystidia. Pileipellis of repent, interwoven, filamentous hyphae, weakly or non-gelatinous, smooth or helically incrusted.

14b Not on madrone bark 15

15a (14) Pileus (0.8)1.0–2.4(3.5)cm, brownish orange to light brown; on fallen leaves of oak (*Quercus*), tanbark oak (*Lithocarpus*) and Chinkapin (*Castanopsis chrysophylla*) *Marasmius copelandii*

**NOTES** characterized by a brownish orange to light brown pileus (0.8)1.0 – 2.4(3.5)cm, a minutely hairy stipe 2-6.5cm long, pale orange-white at top, dark brown to dark reddish-brown below, an alliaceous odor, and growth on fallen leaves particularly of oak. Microscopic features include long spores (13.2-17.1x3-3.9µm). According to Desjardin (1987) this is “the most commonly collected alliaceous marasmioid fungus in California.” It likely also occurs in Oregon; please report findings of this species to the author.

**SIMILAR** *Marasmius alliaceus* is a European species with a more robust darker pileus, longer darker pruinose but less densely hairy stipe which is brown at top only (black further down), and smaller almond-shaped spores (9-11.1x6-7.2(7.8) μm); *Marasmius scorodonius* occurs on coniferous detritus and has a glabrous, red-brown stipe with lighter top, shorter spores (7.8-9x3.3-4.2 μm), and more highly diverticulate cheilocystidia; *Marasmius salalis* has different habitat and larger spores; *Marasmiellus filopes* has minute 0.1-0.3cm pileus, and stipe insititious on needles

**PILEUS** 0.8-2.4cm, convex when young, becoming nearly plane, with uplifted margin; brown when young, light brown or brownish orange when old; glabrous, disc smooth or wrinkled, margin even or rugulose-striate. **LAMELLAE** adnate to adnexed, close to subdistant, rarely forked or interveined; orange-white or pale grayish orange, often spotted light brown when old. **STIPE** 2.5-6.5(7.5)x0.1-0.4cm, round in cross-section or flattened and cleft, equal, not insititious; pale orange-white at top, darkening below to brown or dark reddish brown; pubescent at top, central part velvety, base tomentose. **ODOR and TASTE** strongly alliaceous. **HABITAT** gregarious to subcaespitose on or among senescent leaves of oak (*Quercus* spp.), tanoak (*Lithocarpus densiflora*), and chinkapin (*Castanopsis* spp.) in mixed woods.

**MICROSTRUCTURES** spores 13.2-17.1x3-3.9 μm, tear-shaped or clavate, typically curved; pleurocystidia absent, cheilocystidia abundant, with one or several rounded lobes or diverticula.

15b Stipe base insititious; sporocarps scattered to gregarious; pileus size 0.5-1.0cm

 *Marasmius thiersii*

 (See notes on *M. thiersii* at key step 12.)

16a (6) Pileus minute, 0.3-0.6cm, distinctly hairy, particularly at the margin; on fallen needles of Sitka spruce (*Picea sitchensis)* *Crinipellis piceae*

**NOTES** identified by small fruiting bodies on conifer needles and debris, coarse dextrinoid hairs on pileus, frequently ciliate pileus margin, and thin tough dark stipe.

A relative of *C. piceae*, *Crinipellis stipitaria*, has been reported several times by Sharon Godkin from Victoria, BC (I. Gibson, pers. comm.). The most distinctive character of this species (in addition to the fibrillose pileus) is its habitat on graminoid hosts in grasslands. Please report occurrences of this fungi (and send specimens) to the author!

**PILEUS** 0.3-0.7(1.0)cm, convex to bell-shaped, becoming plane; whitish to buff or tinged tawny except for the dark (tawny-brown or blackish) center, which is often surrounded by a dark circle; dry, opaque, with appressed, radiating, matted, brown fibrils and scales, margin usually dentate (toothed) from radiating fibrils. **LAMELLAE** narrowly adnate, close, narrow or moderately broad; white. **STIPE** 1.8-3.2x0.01-0.1cm, usually straight, horny to pliant, individually insititious on conifer needles, forming a slight basal disc; bay to dark brick basally, paler above, and covered with a grayish-white pubescence which is more conspicuous when dry. **ODOR and TASTE** not distinctive. **HABITAT** gregarious on needles of Sitka spruce (*Picea sitchensis*) and western hemlock (*Tsuga heterophylla*), on needle beds that are on bare or partially moss covered ground, noted along the margins of roads through spruce forests and, along the Pacific coast, common on the ridge tops of forested shore dunes exposed both to periods of dry offshore breezes and periods of heavy fog.

**MICROSTRUCTURES** spores 7-9x3-4.5 μm, narrowly elliptic to subcylindric; cheilocystidia abundant, clavate with 6-12 finger-like apical projections; hairs on pileus dextrinoid.

16b Pileus not fibrillose 17

**17 (16) Note – this is a trifurcate key choice. Here marasmioid fungi are divided into minute, small, and not-small groups. Alliaceous fungi are included)**

 **Pilei less than one cm in diameter 18**

 **Pilei average between 1 and 2 cm in diameter 30**

 **Pilei average more than 2 cm in diameter 39**

**“MINUTE” MARASMIOD FUNGI (Pilei averaging less than 1 cm in diameter)**

18a (17) Stipe tough, hair-like or bristle-like, <1mm diameter, dark brown to black when mature, glabrous; black rhizomorphs usually present in substrate 19

18b Stipe not hair-like or bristle-like (if <1mm, not dark brown to black when mature) 21

19a (18) Pileus dark reddish brown, dark brown, or brownish pink, fading when old to light yellowish brown; on leafy detritus of pine (*Pinus*), redwoods (*Sequoia*), hardwoods, rarely on fern fronds *Marasmius androsaceus*

**NOTES** features include small brownish pileus, tough hair-like blackish stipe, black rhizomorphs usually coming from base, habitat on needles, twigs or leaves, and cystidia on lamellar edges; distributed throughout the northern hemisphere but **Check Ron Peterson’s research.** Compare to the very similar *Marasmius pallidocephalus* and *M. quercophilus* (see comparative notes at key step 20b).

**PILEUS** 0.2-1.0(2.0)cm, convex becoming plane or umbilicate; dark reddish brown to pale brown or flesh-colored, fading when old; glabrous, radially wrinkled or striate. **LAMELLAE** usually adnexed to adnate; close to subdistant, narrow; pale orange-white when young, grayish orange or grayish brown when old, occasionally forked. **STIPE** 2.0-7.0x0.05-0.13cm, equal or narrowing downward, insititious, bristle-like, dull or shiny, glabrous; top light brown or pale reddish brown when young, darkening when old, base dark brown or black; black bristle-like rhizomorphs abundant. **ODOR and TASTE** mild. **HABITAT** gregarious on dead needles and leaves (rarely bark) of pine (*Pinus*), coast redwood (*Sequoia sempervirens*), hardwoods, ericaceous shrubs, and rarely fern fronds, in mixed coniferous-hardwood forests.

**MICROSTRUCTURES** spores (6)7.2-8.7x3.3-4.2(4.5) μm, elliptic or almond-shaped; pleurocystidia absent; cheilocystidia abundant, diverticulate; clamp connections present; walls of cortical hyphae of stipe smooth.

19b Pileus lighter in color; habitat different 20

20a (19) On needles of hemlock (*Tsuga*), spruce (*Picea*), Douglas fir (*Pseudotsuga*) and fir (*Abies*), rarely on pine (*Pinus*) *Marasmius pallidocephalus*

**NOTES** features include small reddish- to orange-brown pileus that becomes pale in age, hair-like dark stipe, rhizomorphs coming from base, growth on needles, and lack of cheilocystidia, pleurocystidia and clamp connections. Compare to *M. androsaceus* and *M. quercophilus* (key step 20b).

**PILEUS** 0.2-1.4cm, convex becoming plano-convex, often papillate; brown, light brown, or brownish orange when young, fading slightly in age; glabrous, striate to rugulose-striate. **LAMELLAE** adnate or adnexed, subdistant to distant; buff to orange-white. **STIPE** 1.2-4.3x0.02-0.1cm, bristle-like, insititious; top grayish brown or light brown becoming brown when old, base dark brown throughout maturation; shiny, glabrous; rhizomorphs rare or abundant, bristle-like, brown or dark reddish brown. **ODOR and TASTE** mild. **HABITAT** gregarious on senescent needles of hemlock (*Tsuga*), spruce (*Picea*), Douglas-fir (*Pseudotsuga*), or fir (*Abies*), very rarely on pine (*Pinus*).

**MICROSTRUCTURES** spores (6)6.6-9.8x2.5-4.2 μm, elliptic to narrowly almond-shaped; cheilocystidia and pleurocystidia absent; clamp connections absent.

20b On leaves of oak (*Quercus*) or tanoak (*Lithocarpus*) *Marasmius quercophilus*

**NOTES** “one of the more common oak-leaf loving species of *Marasmius* in California” according to Desjardin. Please report collections of this species north of California to the author.

*Marasmius pallidocephalus*, *M. androsaceus* and *M. quercophilus* are readily recognized by the hair-like or bristle-like stipes. They are not alliaceous. All have black rhizomorphs in the substrate, although sometimes these may be absent in *M. pallidocephalus*. *Crinipellis* spp. also have rhizomorphs, but can be distinguished by their distinctly silky/fibrillose pilei.

*M. androsaceus* and *M. pallidocephalus* are very similar but can be distinguished macroscopically by the characters given in the key. In addition, *M. androsaceus* and *M. quercophilus* have diverticulate cheilocystidia whereas *M. pallidocephalus* lacks cheilocystidia altogether. The walls of the cortical hyphae on the stipe of *M. androsaceus* are smooth, whereas the same cells on *M. pallidocephalus* are irregularly incrusted or spirally thickened.

*M. quercophilus* has also been confused with *M. epiphyllus* (key step 26b). The latter does not occur on oak leaves, lacks rhizomorphs and has a pruinose stipe, a hymeniform pileipellis and non-diverticulate cheilocystidia.

**PILEUS** 0.2-0.6cm, convex or broadly convex; glabrous or minutely granulose, striate to sulcate; dark brown fading to light brown to pinkish buff on the margin. **LAMELLAE** adnate to adnexed, distant, not intervenose, white or pale pinkish white. **STIPE** 0.10-0.20x0.05-0.075cm, terete, insititious, bristle-like, shiny; apex minutely pruinose; pale grayish orange at apex when young, darkening below to nearly black, base with scattered fibrils; rhizomorphs abundant, dark reddish brown or black. **ODOR and TASTE** not distinctive. **HABITAT** scattered to gregarious on senescent leaves of oak (*Quercus* spp.) or tanoak (*Lithocarpus densiflora*). Common in mixed hardwood forests in California at least.

**MICROSTRUCTURES** spores 8.4-10.2(11.4)x3-4.2(4.8) µm, ellipsoid or almond-shaped. Cheilocystidia diverticulate. Pleurocystidia not diverticulate, not projecting. Pileipellis composed of repent and erect diverticulate hyphae.

21a(18) On dead grasses and sedges and hardwood twigs; pileus 0.2-1.3cm, whitish with buff, fawn, cinnamon or rosy tints; lamellae whitish to faintly salmon or rosy buff; stipe thin, tough, pliant, often curved, buff to cinnamon in upper part and darker lower down *Marasmiellus vaillantii*

**NOTES** This is a difficult marasmioid fungus to distinguish from its tiny relatives, in part because of the many substrates on which it may be found (see habitat, below). It may best be field identified via the process of elimination. By eliminating the alliaceous and bristle-stiped (like *M. androsaceus*), the extremely minute (1-2 mm pileus diam.) and those found on special substrates (such as *Populus* and *Dryas* – see below), you might arrive correctly at *M. vaillantii*. Check the microscopic features.

**PILEUS** 0.2-1.3cm, convex becoming plane, margins sometimes becoming crisped or uneven; whitish with buff, rosy buff, fawn or cinnamon tints centrally; rugose, opaque, or vaguely translucent-striate. **LAMELLAE** adnate, moderately broad to narrow, sometimes forked or with anastomoses; white varying to faintly salmon or rosy buff. **STIPE** 0.3-2.2cmx0.02-0.1cm, buff to cinnamon or ochraceous in upper part, darkening below in older specimens; powdered to minutely pubescent overall or becoming glabrous in lower part. **ODOR and TASTE** not distinctive. **HABITAT** Redhead (1981) describes the habitat of *Marasmiellus vaillantii* as found on senescent sheaths of sedge(*Carex*), on senescent leaves of rush(*Juncus*), on twigs of red alder(*Alnus rubra*) and, in Ontario, on black willow (*Salix nigra*). Desjardin (1997) gives the habitat in the southern Appalachian Mountains as on leaves of ferns (*Osmunda*) and grasses (*Carex*) or on twigs or bark of alder (*Alnus*) and willow (*Salix*) in wetland environments, and in drier forests on twigs or bark of beech (*Fagus*), tulip poplar (*Liriodendron*), sycamore (*Platanus*), pine (*Pinus*), and hemlock (*Tsuga*).

**MICROSTRUCTURES** spores 8.0-9.2x3.8-4.1 μm, more or less elliptic; cheilocystidia abundant, forming a sterile to nearly sterile margin, with a short or long cylindrical pedicel and an obtusely coralloid apex; pileipellis of repent, interwoven, filamentous hyphae ends varying from relatively undifferentiated to coralloid.

21b Not as above; if on leaves of sedges or grass, then pilei smaller 22

22a (21) Sporocarps found growing on leaves of sedges (*Carex* spp.),rushes *(Juncus* spp.) or grass 23

22b Sporocarps growing on different substrates 25

23a (21) Pileus ½ - 2 millimeters in diameter *Marasmius* *limosus*

**NOTES** Basidiocarps don’t come any smaller than this (with the exception of *Marasmiellus* *filopes*, key step 9). Other features include lack of odor, striate pileus that is buff to pale fawn with darker cinnamon disc, distant lamellae that are adnate to a free collar, thread-like stipe (0.005-0.01cm) that is black in lower part and brownish to whitish at top, growth on sedge and grass stems, and microscopic characters including distinctive cheilocystidia. Its distribution is at least from eastern to western Canada and also in Europe, but its small size and unusual habitat probably renders this species under-collected and under-reported.

**PILEUS** 0.05-0.25cm, cushion-shaped to convex with disc plane to low umbonate, sometimes with flaring edges; buff to pale fawn with darker cinnamon disc; opaque, obscurely to prominently grooved-striate, edges scalloped. **LAMELLAE** 6-9 adnate to a free collar, distant, moderately broad; white. **STIPE** 0.4-3.6cmx0.005-0.01cm, thread-like, wiry, insititious, arising from subepidermal, poorly delimited, sclerotium-like base; black in lower part, brownish to whitish at top; glabrous, twisting when dry. **ODOR and TASTE** not distinctive. **HABITAT** scattered on dead leaves of grasses, sedges or common reed (*Phragmites communis*); in dense moist culms or hummocks in open marshes, along lake margins, or other wet areas.

**MICROSTRUCTURES** spores 9.7-12.1x4-5.5 μm, elliptic to oval; basidia 1-spored to 2-spored; cheilocystidia abundant, similar to pileipellis cells; pileipellis a palisade of clavate to turbinate cells, with thin to pronounced pale to dark ochraceous walls, densely covered by small finger-like processes usually in compact rosettes and occasionally forked.

23b Pileus larger 24

24a (23) Pileus 2-7.5 millimeters in diameter, white; stipe white and minutely hairy

 *Marasmius caricis*

**NOTES** features include small white pileus; lamellae white, distant and fold-like, with anastamoses forming a net-like or poroid surface; minutely downy stipe; growth on *Carex* or *Scirpus*; and elongate spores. Similar to *Marasmiellus vaillantii* (key step 21a), which has a darker pileus and stipe and shorter spores.

**PILEUS** 0.2-0.75cm, cushion-shaped, becoming convex and sometimes slightly depressed, membranous; pure white; radially furrowed and wrinkled in age, slightly micaceous under low magnification. **LAMELLAE** adnate, distant, moderately sized, fold-like to vein-like in larger pilei, in smaller pilei sublamellae and anastomoses forming a net-like to poroid surface with a few dominant lamellae; white. **STIPE** 0.15-0.3x0.01-0.2cm, often off-center; white; minutely pubescent; appearing nearly insititious without magnification. **ODOR and TASTE** not distinctive. **HABITAT** scattered on sedge (*Carex*) and rushes (*Scirpus*) under dense leaf cover in open marshes.

**MICROSTRUCTURES** spores 13.2-16.0x5-6.4 μm, elliptic to fusiform; cheilocystidia prominently projecting, not diverticulate; pileus cuticle a derm, the cells thickened apically, agglutinated by a thin gelatinous matrix, and with pileocystidia similar to cheilocystidia.

24b Pileus 0.2-1.3cm, whitish with buff, fawn, cinnamon or rosy tints; lamellae whitish to faintly salmon or rosy buff; stipe thin, tough, pliant, often curved, buff to cinnamon in upper part and darker lower down *Marasmiellus vaillantii*

 See description at key step 21a.

25a (22) On leaves of cottonwood or aspen (*Populus*) OR lamellae vein-like or fold-like or absent 26

25b Gills not vein-like or fold-like and not on leaves of cottonwood or aspen 27

26a (24) Pilei extremely small – 2-4 millimeters in diameter; only 3-8 lamellae present *Marasmius* *tremulae*

**NOTES** features include very small size, white color, distant lamellae, finely bristly stipe, and growth on *Populus*. Similar to *M. epiphyllus* (key step 26b) which grows on a variety of habitats including *Populus tremuloides*, but *M. tremulae* has smaller size, fewer recognizable lamellae, and 2-spored basidia.

**PILEUS** 0.2-0.4cm, hemispheric then convex; white; very finely downy. **LAMELLAE** distant (numbering 3-8), rarely dividing. **STIPE** about 1cm long and 0.03cm wide, finely bristly. **ODOR and TASTE** not distinctive. **HABITAT** on leaves of black cottonwood (*Populus trichocarpa*) in North America, on European aspen (*Populus* *tremula*) in Europe. Collections of minute marasmioids on any *Populus* species in North America should be checked and reported.

**MICROSTRUCTURES** spores 11-14x2.8-4 μm, cystidia with crystal heads, 2-spored basidia, hyphae without clamp connections.

26b Pilei 0.1-1.5cm; lamellae distant, vein- or fold-like, or absent altogether

 *Marasmius* *epiphyllus*

**NOTES** characterized by small white convex and minutely wrinkled pileus, rudimentary vein-like distant lamellae that are white or pale yellowish, thread-like pruinose stipe that is whitish above and dull yellowish brown at the base. Usually on aspen leaves, sometimes on other substrates (see habitat). Distribution circumboreal. *Marasmiellus filopes* has a distinct garlic odor, a pileus cuticle composed of repent diverticulate hyphae, and is restricted to growth on coniferous debris, *Marasmius tremulae* has pileus under 0.4cm, grows on aspen leaves, and has longer spores

**PILEUS** 0.1-1.5cm across, convex when young, becoming plane in age; white to yellowish white to yellowish orange in age; minutely pruinose, smooth or in age minutely rugulose. **LAMELLAE** adnate, sometimes attached to an adnate partial collar, distant, 0 to 13 reaching stipe, narrow and vein-like, 1-4 tiers of vein-like sublamellae, interveined; white or pale yellowish white. **STIPE** (0.2)0.6-1.7(3.5)x0.01-0.03cm, insititious; yellowish white overall when young, base becoming yellowish brown to dark brown; shiny, pruinose. **ODOR and TASTE** not distinctive. **HABITAT** usually on leaves of aspen (*Populus tremuloides*), but also reported on a variety of other substrates, including dead horsetail (*Equisetum*) stems, overwintered apple-skins, leaves and sticks of hardwood trees, leaves and stems of blackberry shoots, and dogwood leaves.

**MICROSTRUCTURES** spores (7.1)9.6-12.3(13.2)x(2.8)3.6-4.8(5.4) μm, elongate-elliptic; pleurocystidia and cheilocystidia scattered, not branching or ornamented apically.

27a (25) On leaves of *Dryas* *Marasmius epidryas*

**NOTES** features include small size, reddish-brown to pale ochraceous or buff striate pileus, yellowish brown to whitish lamellae, dark brown stipe with ochraceous velvety coating, lack of odor, and growth on mountain avens (*Dryas*), and distinctive pileo-, cheilo-, and pleurocystidia.

**PILEUS** 0.4-1.5cm, convex, becoming plane with incurved margin and depressed center; dark reddish brown fading to buff or pale ochraceous in older specimens, wrinkled or striate. **LAMELLAE** adnate, subdistant, occasionally forked; light yellowish brown or buff, at times whitish. **STIPE** 1.0-5.6x0.03-0.2cm, subinsititious, at times slightly swollen basally with copious matted buff to ochraceous fibrils; dark brick to blackish brown with ochreous velvety coating. **ODOR and TASTE** not distinctive. **HABITAT** scattered to gregarious on dead cortical tissues of living stems and roots of yellow mountain avens (*Dryas drummondii*), entire-leaf mountain avens (*D. integrifolia*), and eight-petaled mountain avens (*D. octopetala*), in arctic and alpine tundra and montane valley bottoms along creek or glacier paths, possibly also on bog blueberry (*Vaccinium uliginosum*).

**MICROSTRUCTURES** spores 8-11.2x5-6.5 μm, almond-shaped to elliptic; pleurocystidia and cheilocystidia similar, up to 55 μm long, fusoid to rostrate-clavate, without apical ornamentation; pileipellis a somewhat hymeniform layer embedded in a subgelatinous, colorless to brownish material, with embedded, reddish brown sclerocystidia.

27b Substrate different 28

28a (27) On decorticated wood; pileus 0.5-1.9cm, rosy-buff to wine colored; stipe silky to frosty and whitish to rosy buff or buff in upper part and cinnamon to dark brick in lower part *Marasmiellus* *papillatus*

**NOTES** Contrary to the species epithet, the pileus of this mushroom is not usually papillate, but is rather plano -convex to depressed. Apparently the author of the name goofed but because the name was validly published, we’re stuck with it.

Characterized by small size, pileus color, whitish lamellae, stipe silky to frosty and whitish to rosy buff or buff in upper part and cinnamon to dark brick in lower part, habitat, and very long pleuro- and cheilocystidia.

Although most species of *Marasmiellus* have insititious stipes, the stipe insertion of *M. papillatus* is not clear from the literature. The author would appreciate specimens

**PILEUS** 0.5-1.9cm, convex, becoming plano-convex to depressed; at first rosy buff to dark vinaceous, soon fading to whitish with rosy buff to cinnamon tints; frosted except in old expanded pilei, wrinkled. **LAMELLAE** adnate, usually with a decurrent tooth, close to subdistant; faintly buff to rosy buff to nearly white. **STIPE** 2.0-4.3x0.08-0.35cm, equal or narrowing in lower part; pale in upper part, cinnamon to dark brick basally; silky to frosty. **ODOR and TASTE** vaguely bitter or not distinctive. **HABITAT** arising from silt- or moss-covered wood, on decorticated hardwood and coniferous branches, and on log pieces in wet depressions or forested areas.

**MICROSTRUCTURES** spores 8.2-13x3.3-4.1 μm, cylindric to elliptic; pleurocystidia and cheilocystidia up to 90 μm; pileipellis composed of interwoven, filamentous hyphae with dense cytoplasm and coralloid hyphal ends when young.

28b Not as above 29

29a (28) Attached to individual needles of conifers via insititious stipe *Marasmiellus* *pluvius*

**NOTES** characterized by soft, fragile, putrescent fruiting body with pale orange to brownish orange pileus, white lamellae, insititious pruinose stipe pale at top and red-brown at base, growth on needles, and distinctive cheilocystidia. Common on needle beds in the Vancouver, B.C. region, at least.

**PILEUS** 0.5-1.2cm across, convex becoming plane to depressed; pale orange to brownish orange; glabrous, somewhat wrinkled to rugose and translucent-striate old. **LAMELLAE** adnate, close or subdistant; whitish to buff on faces, whitish on edges. **STIPE** 1.4-3.0x0.08-0.2cm, narrowing downwards, insititious; white or buff or pale orange at top, darkening below to brown or reddish brown; pruinose to scabrous, becoming glabrous in age. **ODOR and TASTE** not distinctive. **HABITAT** gregarious to scattered, attached individually to fallen needles of conifers.

**MICROSTRUCTURES** spores 8.5-11.2(12)x2.3-4.0 μm, narrowly elliptic to narrowly fusoid; pleurocystidia absent; cheilocystidia forming a sterile edge, densely covered with apical projections; pileipellis of densely diverticulate hyphae vaguely incrusted and pale brownish, and also with thick-walled, clavate or vesiculose elements with long rod-like projections.

29b Not as above 7

Note: This key choice sends you to the section for marasmioid fungi with alliaceous odors, several of which are very small (*Marasmiellus* *filopes*, *Micromphale* *perforans*, *Marasmius* *thiersii*, *Micromphale* *arbuticola*); you may have missed this characteristic.

**“SMALL” MARASMIOID FUNGI (Pilei** **averaging between 1 and 2 cm)**

30a (17) **()** Lamellae close to crowded, with lilac tints; stipe base tomentose, matted, and/or with long, coarse hairs

 *Baeospora* *myriadophylla*

 see key step 4

30b Lamellae lacking purple/violet tints, but may have pinkish or wine-colored tints 31

31a (30) Pilei predominantly white, but may have pinkish colors in age *Marasmiellus candidus*

**NOTES** features include pileus white with pink tinges in age, membranous, plicate; lamellae very distant and intervenose; stipe white at apex, nearly black below, pruinose, base bulbous, subinsititious, on sticks, branches and logs of a variety of woody species, including (but not limited to) *Picea*, *Tsuga*, *Pseudotsuga*, *Rubus*. Common.

Microscopically, *M. candidus* differs from many *Marasmiellus* species in lacking a true rameales structure (hyphae of pileipellis prostrate with short, erect ends which frequently have short, irregular branches). Instead, *M. candidus* has irregularly cylindric pileocystidia interspersed among interwoven, typically smooth hyphae.

Another light-colored marasmioid mushroom with pinkish stains in age is *M. chordalis*, which occurs on buried pieces of fern and thus appears terrestrial; it also has a long, rigid stipe and sub-distant lamellae. (key choice 38)

**PILEUS** 0.8-4.0(5.5)cm, convex becoming plane or slightly depressed with uplifted margin when old; white overall when young, becoming buff when old, often discoloring pinkish; very thin-fleshed; glabrous, becoming minutely pruinose, dull, typically opaque, striate or sulcate when old. **LAMELLAE** adnate or subdecurrent, distant, typically interveined; white at first, yellowish white or pale orange-white when old, often staining dingy pinkish in spots or overall. **STIPE** 0.5-3x0.1-0.4cm, often short, often curved, central or eccentric; at first white or with gray to pinkish gray base, darkening gradually to brownish black from the base upward, subinsititious, base pubescent or fibrillose. **ODOR and TASTE** mild. **HABITAT** densely gregarious on bark, barkless wood, and sticks of a variety of species, including spruce (*Picea*), hemlock (*Tsuga*), Douglas fir (*Pseudotsuga*), alder (*Alnus*), rarely redwood (*Sequoia*), myrtle (*Umbellularia*), berry canes (*Rubus*), or sword fern (*Polystichum*).

**MICROSTRUCTURES** spores 11.4-15(16.2)x3.6-5.4 μm; cheilocystidia cylindric or irregular in outline; pleurocystidia absent; pileus cuticle of repent, interwoven, smooth or weakly diverticulate hyphae and scattered pileocystidia.

31b Pilei creamy, buff or darker – light brown, brown, orange brown, pinkish, or wine colored 32

32a (31) Pilei with pinkish or wine-colored (rose to burgundy) tints 33

32b Pilei lacking wine-colored tints, but rather in the buff to brown series 34

33a (32) Pilei 0.5-1.9cm, rosy buff to wine-colored, convex to plane to depressed, with frosted or opaque appearance; stipe 2.0-4.3cm long *Marasmiellus* *papillatus*

 see key step 28a

33b Pilei 1-4(5)cm, bay-brown to reddish-brown, brown, wine-red, or maroon conical to bell shaped when young, broadly conic or convex when old, surface somewhat velvety; stipe 5-13cm long *Marasmius* *plicatulus*

**NOTES** distinctive features are size, velvety wine-red to brown pileus, distant lamellae, and long shining reddish-black brittle stipe.

**PILEUS** 1-4(5.5)cm across, obtusely conic to bell-shaped, expanding to convex or plane; bay-brown to reddish brown, brown, wine-red, or maroon; with a velvety or frosted appearance, furrowed or wrinkled when old or dried. **LAMELLAE** adnexed, distant, broad; buff or yellowish white. **STIPE** 6.0-9.5x0.2-0.3cm, not insititious; top grayish red or brown, base dark brown to black; shiny, glabrous in upper part, base covered with white, strigose mycelial hairs, basal mycelium forming an extensive mycelial mat. **ODOR and TASTE** mild. **HABITAT** gregarious in humus or grassy areas under oaks or various conifers.

**MICROSTRUCTURES** spores 12.3-16.2(16.6)x4.8-6.3 μm, almond-shaped or subfusiform; pleurocystidia absent, cheilocystidia abundant in young specimens, often scarce in older specimens, with numerous diverticula which are yellow or pale ochraceous and dextrinoid.

34a (32) On fallen leaves of salal (*Gaultheria* *shallon*) or Oregon grape (*Berberis* *aquifolium*)

 *Marasmius* *salalis*

 see key step 13a

34b Habitat otherwise 35

35a (34) On fallen leaves of oak (*Quercus*), tanbark oak (*Lithocarpus*) and chinkapin (*Castanopsis*) *Marasmius* *copelandii*

 see key step 15a

35b Habitat on coniferous detritus or, rarely, detritus under ferns 36

36a (35) Stipe glabrous *Marasmius* *scorodonius*

 see key step 11a

36b Stipe not glabrous 37

37a (35) Sporocarps densely gregarious to subcaespitose; odor alliaceous *Marasmius* *applanatipes*

 see key step 12b

37b Sporocarps not densely gregarious; odor mild 38

38a (37) Gills close to crowded; pileus buff to dark brown; stipe base with brownish-orange mycelium; on coniferous detritus; odor not distinctive; spores inamyloid *Strobilurus* *albipilatus*

**NOTES** This species does not key out well macroscopically, as its key features are microscopic (small, inamyloid spores and absence of clamp connections) and its macroscopic features are not particularly distinctive. In fact, it hardly qualifies as a marasmioid fungus to begin with, but is included here because of its affiliations. *Strobilurus* *albipilatus* is distinctive *within the genus* for NOT always occurring on cones (but see below), but if you don’t know this is a *Strobilurus* because you haven’t seen the microscopic features, it might pass for a number of other marasmioid fungi. See the comparative discussion of *Strobilurus* species on key step 3b.

Furthermore, the occurrence of *S. albipilatus* on cones is controversial – Desjardin (1987) gives for habitat “scattered to gregarious among debris and decayed logs of *Abies* and *Pinus*, very rarely on cones of *Pinus* spp. Montane.” Redhead (1980) says they are commonly on the cones of Douglas fir. We need more people saving small marasmioid fungi and examining their spores in Melzer’s and their septa for clamp connections.

**PILEUS** 0.5-3.7cm, convex to plane, becoming depressed when old, somewhat hygrophanous; very variable in color, typically dark grayish brown overall when young, soon grayish brown or yellowish brown; glabrous, rugulose, translucent-striate when moist. **LAMELLAE** adnate to adnexed, crowded to distant; white. **STIPE**  2-8(15)x0.15-0.32cm, equal, often with a root-like pseudorhiza up to 6cm long; top white or pale yellowish white to pale orange-brown, base brownish yellow to light brown; top glabrous or pruinose, mid-part pubescent, base tomentose, typically covered with downy, pale orange-white mycelium. **ODOR and TASTE** not distinctive. **HABITAT** see notes in discussion above. The following substrates have been noted in the literature: on senescent often buried cones of Douglas fir (*Pseudotsuga menziesii*) and pine (*Pinus* spp.), wood of paper birch (*Betula papyrifera*), unidentified woody debris including stumps and masses of buried cone scales husked by rodents, and debris and dead logs of fir (*Abies*) and pine (*Pinus*).

**MICROSTRUCTURES** spores 3-7.5x1.5-3.5 μm, elliptic, inamyloid; pleurocystidia and cheilocystidia up to 66um long, lacking membrane bound resinous vesicle or apical collarettes, thin walled; pileipellis hymeniform, with scattered pileocystidia similar to pleuro- and cheilocystidia.

38b Pileus grayish-yellow to olive-brown, or cream-colored, developing reddish spots in age; lamellae subdistant, white to cream, also with reddish spots in age; stipe 5-11cm long, pruinose, radicating *Marasmius chordalis*

**NOTES** *Marasmius chordalis* is rare in California, known from only two collections from northern coastal coniferous forests. It is characterized by grayish yellow or olive-brown pileus, subdistant, white lamellae, a pruinose, radicating stipe pale grayish at the apex and dark brown at the base, and by very broad lemon-shaped spores.

Petersen (2000) renamed this species *Rhizomarasmius undatus*. Until the molecular systematic dust settles a bit more, *M. chordalis* is retained.

Similar species include *Strobilurus albipilatus*, which lacks clamp connections, has smaller spores, has a stipe base covered with brownish-orange mycelium, and grows at higher elevations.

**PILEUS** 1.0-2.5cm broad, convex to broadly convex with a central depression; surface pruinose, glabrescent;olivaceous brown fading to light yellowish brown or olive-gray. **LAMELLAE** adnate or short decurrent, subdistant, white or yellowish becoming light yellowish brown or olive-gray in age. **STIPE** 6.0-10.0x0.15-0.25cm, terete, equal, radicating, cartilagi­nous, pruinose, more so at base; white or gray above, dark grayish yellowish brown or dark brown below. **ODOR and TASTE** not distinctive. **HABITAT** solitary to gregarious in duff, on buried pieces of dead bracken fern (*Pteridium aquilinum*) in coastal coniferous forests.

**MICROSTRUCTURES** spores 8.1-12x4.2-6.3 μm*,* lemon-shaped or almond-shaped, or longer; cheilocystidia tenpin-shaped, pleurocystidia rare, similar to the cheilocystidia. Pileipellis hymeniform.

**“LARGE” MARASMIOID FUNGI (Pilei** **2cm diameter or larger)**

39a(17) Pilei predominantly white, but may have pinkish colors in age; insititious on wood or sticks *Marasmiellus* *candidus*

see key step 31

39b Not as above 40

40a (39) Terrestrial, usually in fairy rings in lawns and other grassy areas *Marasmius* *oreades*

**NOTES** Probably the best known of the marasmioid fungi for its domestic habit and fine edibility. Distinguished by a light brownish pileus which is often obtusely umbonate, broad white to buff lamellae that are fairly well spaced and not decurrent, thin tough stipe, growth in fairy rings in grass, and strong marcescence.

**SIMILAR** *Clitocybe dealbata*, a poisonous species, is also white-spored and grows in grass sometimes in rings near *Marasmius oreades*, but has thin, crowded, adnate to decurrent lamellae and a convex to plane but not umbonate pileus; *Gymnopus luxurians*, documented by the author from Oregon, sometimes grows in grass but has a reddish brown pileus, a thicker less tough stipe, close lamellae, conspicuous cheilocystidia, and a pileus cuticle composed of repent, radially oriented, cylindric hyphae.

**PILEUS** 1-5(6)cm, bell-shaped or convex when young, plano-convex and broadly umbonate when old; disc brown when young, light brown or paler when old; glabrous, smooth or minutely rugulose. **LAMELLAE** adnate, adnexed or free, subdistant, broad, rarely forked or interveined; white to pale tan. **STIPE** 2-8x0.15-0.6cm, equal or narrowing downward, tough, pliant, not insititious; colored like the pileus or paler (whitish); top pubescent, base felted or tomentose. **ODOR** faintly or strongly of almonds (cyanic). **TASTE** mild. Edible, with the usual precautions. **HABITAT** gregarious in grass, usually in arcs or fairy rings.

**MICROSTRUCTURES** spores 6.6-10x3.5-6 μm, elliptic, almond-shaped, or lemon-shaped; pleurocystidia and cheilocystidia absent; pileus cuticle hymeniform, cells without apical projections, weakly dextrinoid walls up to 1 μm thick, tramal hyphae dextrinoid.

40b Not as above 41

41a (40) Are you sure it’s not alliaceous? 42

41b Maybe it IS alliaceous after all 14

42a (41) Mushrooms putrescent (not marcescent), omphalinoid, on leaves of pine (*Pinus*), madrone (*Arbutus*), or redwood (*Sequoia*) *Marasmius* *calhouniae*

**NOTES** If your mushroom matches this description, why are you using this key? These are not characteristics of marasmioid fungi! The only reason this species is included is because, for technical taxonomic reasons, *M. calhouniae* is considered a member of the genus *Marasmius*, which makes it a marasmioid fungus by association, if not by appearance. Also, according to Desjardin (1987), it is common in bishop pine forests of coastal California; since bishop pine forests extend well north beyond California’s borders, it may also occur in Oregon and Washington.

Features include: pilei whitish or yellowish gray, rugulose-striate; lamellae subdecurrent, strongly intervenose; stipe glabrous, thick, and dingy white. Microscopically, it has distinctive cystidia, lacks clamp connections, and has weakly dextrinoid tramal tissue.

Basidiocarps fragile, putrescent. not reviving.

**PILEUS** 1.2-4.5cm broad, convex becoming plano-convex with a shallow central depression; surface glabrous, smooth; pale gray becoming yellowish gray in age; margin translucent, becoming rugulose-striate in age. **LAMELLAE** adnate or subdecurrent, subdistant or distant, strongly intervenose in age, white or yellowish white. **STIPE** 2.2-5.5x0.2-0.5(0.7)cm, terete, equal or narrowed downward, non-insititious, glabrous, fibrous but easily broken; white when young, base becoming yellowish white to brownish orange; base with downy, white or grayish orange mycelium. **ODOR and TASTE** mild. **HABITAT** on senescent leaves of pine (*Pinus* spp.), coastal redwood (*Sequoia sempervirens*), madrone (*Arbutus menziesii*), rarely tanoak (*Lithocarpus densiflora*).

**MICROSTRUCTURES** spores 9-11.4x3.6-5.1µm, ellipsoid, almond-shaped, or tear-shaped; cheilocystidia uncommon, capitulate or ventricose-capitate, pleurocystidia similar to cheilocystidia; pileus cuticle hymeniform, tramal tissue weakly dextrinoid, clamp connections absent.

42b Not as above: Try another genus, i.e., *Gymnopus, Mycena*, or *Clitocybe,* or maybe you have found an undescribed species. Take good notes, preserve the specimen, and contact the author*.*

Appendix EXCLUDED SPECIES

Generally speaking, a species is excluded from this key for one of two reasons. The first is taxonomic – it may have been renamed according to the rules of nomenclature. The second is that although it may appear in common field guides or have been reported by word of mouth, it is not represented by voucher collections in PNW herbaria or it does not appear in major publications on PNW marasmioid fungi.

**GENUS SPECIES NOTES**

*MARASMIELLUS*

*albus-corticis* (synonymized with *Marasmiellus candidus*)

*MARASMIUS*

*alliaceus*. A European species, similar to *M. copelandii*.

*bellipes* = *M. glabellus v. setulosus*. No evidence for its

occurrence in the PNW

*cohaerens* no evidence for its occurrence in the PNW

*glabellus* no evidence for its occurrence in the PNW

*prasiosmus* no evidence for its occurrence in the PNW. Check

 *M. copelandii*.

*rotula* no evidence for its occurrence in the PNW

*siccus* no evidence for its occurrence in the PNW. Check *M. plicatulus*.

*splachnoides* = *M. quercophilus*

*subpilosus* no evidence for its occurrence in the PNW

*undatus* A synonym of *Marasmius chordalis* Fr.

*washingtonensis* status uncertain

*wynnei* no evidence for its occurrence in the PNW

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GENUS *BAEOSPORA*

 *myosura* (Fr.) Singer 2a 10

 *myriadophylla* (Peck) Singer 4a 12

GENUS *CRINIPELLIS*

 *piceae* Singer 16a 18

GENUS *MARASMIELLUS*

 *candidus* (Bolt.) Singer 31a 25

 *filopes* (Peck) Redhead 9a 14

 *papillatus* (Peck) Redhead & Halling 28a 24

 *pluvius* Redhead 29a 24

 *vaillantii* (Pers.:Fr.) Singer 21a 21

GENUS *MARASMIUS*

 *androsaceus* (L.:Fr.) Fr. 19a 19

 *applanatipes* Desjardin 12b 16

 *calhouniae* Singer 42a 29

 *caricis* Karsten 24a 22

 *chordalis* Fr. 38b 27

 *copelandii* Peck 15a 18

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 *oreades* (Bolt.: Fr.) Fr. 40a 28

 *pallidocephalus* Gilliam 20a 20

 *plicatulus* Peck 33b 26

 *quercophilus* Pouz. 20b 20

 *salalis* Desjardin and Redhead 34a 26

 *scorodonius* (Fr.) Fr. 11a 15

 *thiersii* Desjardin 12a 16

 *tremulae* Velen. 26a 22

GENUS *MICROMPHALE* Now considered a part of *Marasmiellus* according to Antonin, Halling & Noordeloos (1997)

 *arbuticola* Desjardin 14a 17

 *perforans (Hoffm.:Fr.) Fr.* 10a 15

 *sequoiae* Desjardin 8a 14

GENUS *STROBILURUS*

 *albipilatus* (Peck) Wells & Kempton 38a 26

 *occidentalis* Wells & Kempton 3a 11

 *trullisatus* (Murrill) Lennox 3b 11