

Technical description of *Amanita constricta* Ammirati & Thiers

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Amanita constricta Ammirati & Thiers. 1982. *Mycotaxon* 15: 65.

Illus.: Arora. 1979. *Mushr. Demyst.*: 252.

Illus.: Arora. 1986. *Mushr. Demyst.* (2nd ed.): 289.

Illus.: Jenkins. 1986. *Amanita* N. Amer.: pl. 35.

Illus.: Arora. 1991. *All Rain Promises*: 73.

Illus.: Tulloss. 1994. *Mycotaxon* 52: Figs. 11-12. [The following is based on the 1994 article.]

[NOTES: See red text below. This text is based on material that is consistent with collections that match the first illustration of *A. constricta* in the set of smaller illustrations circulated as an addendum to Thiers' *Agaricales* (1982) section on *Amanita*. The illustration shows immature material with a distinctly strangulate, although thick, volval sac. A pallid zone is developing inside the ends of the caps' marginal striations, but there is no dark zone at the inner ends of the striations—as in the adjacent picture of *A. pachycolea* (same page). In addition, the stipes of the “true” *pachycolea* illustration are darker due to closely placed gray fibrils on the stipes...continuing up to (or very close to) the stipe apex. The material described below in red is consistent with the type collection of *A. constricta*.

The text in blue (below) is the original macroscopic description, which I believe to contain errors due to inclusion of material of *A. protecta* Tulloss & G. Wright (1989) among the paratypes of *A. constricta*.

Color names beginning in capital letters are from Ridgway (1912). Color codes of the form “” are from the Methuen color scheme e.g., (Anon. 1975). The herbarium code “RET” stands for the author's personal herbarium. All other herbarium codes follow Holmgren et al. (1990).]

PILEUS: 50 - 130 mm wide, gray to brownish gray, Pale Mouse Gray to Light Drab Gray to Drab to Hair Brown, disc at time as dark as Chaetura Black, often with inconspicuous dark radial streaks, convex when young, becoming plano-convex to plane, eventually subumbonate to umbonate in age; *context* white except next to the pileipellis where it is gray to drab, sometimes become faintly pinkish on exposure especially in young basidiocarps, 5 - 17 mm thick at disc, thinning toward margin; *margin* decurved at first, soon plane to undulate, slightly uplifted in age, entirely becoming rimose, strongly sulcate to tuberculate striate (0.2 - 0.25R); *universal veil* absent or as a membranous somewhat fibrillose patch over disc, typically less than 1 mm thick, sometimes breaking up around the edges in age, white to buff to Smoke Gray or sometimes with pale vinaceous shades, bruising salmon color when wetted, slowly returning to white¹.

LAMELLAE: close to crowded, adnate to decurrent by a short hook when young, becoming free, white at first becoming gray, Smoke Gray to Pallid Mouse Gray to Pale Drab Gray, drying tan to sordid tan to brownish gray, (grayer than 7.5YR 6/6 to 10YR 5/4 to 10YR 7-8/4), moderately broad; edge usually gray, fimbriate; *lamellulae* in several ranks.

STIPE: 100 - 160 (-200) mm long, 7 - 17 mm wide at apex, white, cylindric or narrowing upward, apex longitudinally striate or pruinose, becoming appressed fibrillose below, stipipellis often rupturing and forming rings of appressed fibrillose scales which are gray and darken when bruised; *context* white, stuffed, becoming hollow; *exannulate*; *universal veil* membranous, white to pale buff or pale yellow, bruising reddish when wet then fading, becoming gray and submembranous at maturity and then rather easily fragmented and sometimes remaining in large patches in substrate or on lower stipe, adnate to stipe for one-third to one-half of limb length, then flaring in a manner suggesting an annulus, collapsing with age.

ODOR and *taste* not distinctive.

¹. I have never been able to confirm this character in *A. constricta*. Ochraceous staining of the volva (and other tissue) is very common in *A. protecta*.

PILEUS: 93 - 170 mm, brown with frosty appearance inside striations (frosty appearance disappearing and area becoming dark brown when scraped with fingernail), virgate, with disc eventually dark brown, surrounded by a yellow-brown region, remaining brown over striations, subviscid when moist, planoconvex the low broad umbo, eventually concave with marked umbo; *context* white except for brown under pileipellis, gray above stipe, sometimes waterlogged along upper edge of lamellae, 7 - 19 mm thick, thinning evenly for 75-80% of radius, then membranous to margin; *margin* striate (0.2-0.45R), nonappendiculate; *universal veil* absent.

LAMELLAE: free to receding with no decurrent line on stipe, crowded, sordid white in mass, off-white in side view, becoming sordid with age, 8.5 - 15 mm broad, broadest at 75-80%; *lamellulae* truncate to subtruncate, unevenly distributed, of diverse lengths, common to plentiful.

STIPE: 169 -240 × 15 - 24 mm, white to off-white, minimally changing or becoming faintly brown from handling, narrowing upward, flaring at apex very slightly in young material, slightly more in older material, decorated by rather densely placed colored fibrils (dark gray in older material, brown in younger material) covering most of stipe length or basal third of stipe; *context* stuffed (sometimes with large lacunae) to hollow, white to off-white, with watersoaked streaks, with rust-colored spots or staining in bulb, with stuffing material comprising longitudinally oriented white fibers becoming rust-colored where cut, with central cylinder 7.5 - 13 mm wide; *exannulate*; *universal veil* as saccate volva, subtubular, easily torn (*ca.* submembranous), attached very near stipe base, often breaking away from this point of attachment and being drawn up stipe leaving strangulate zone between separated parts of volva (freed limb and portion attached to stipe base), at first white on exterior (slowly becoming dark gray), with interior grayish at first, becoming darker gray before gray shows on exterior; *limbus internus* attached at or immediately above point of separation, about one-third length.

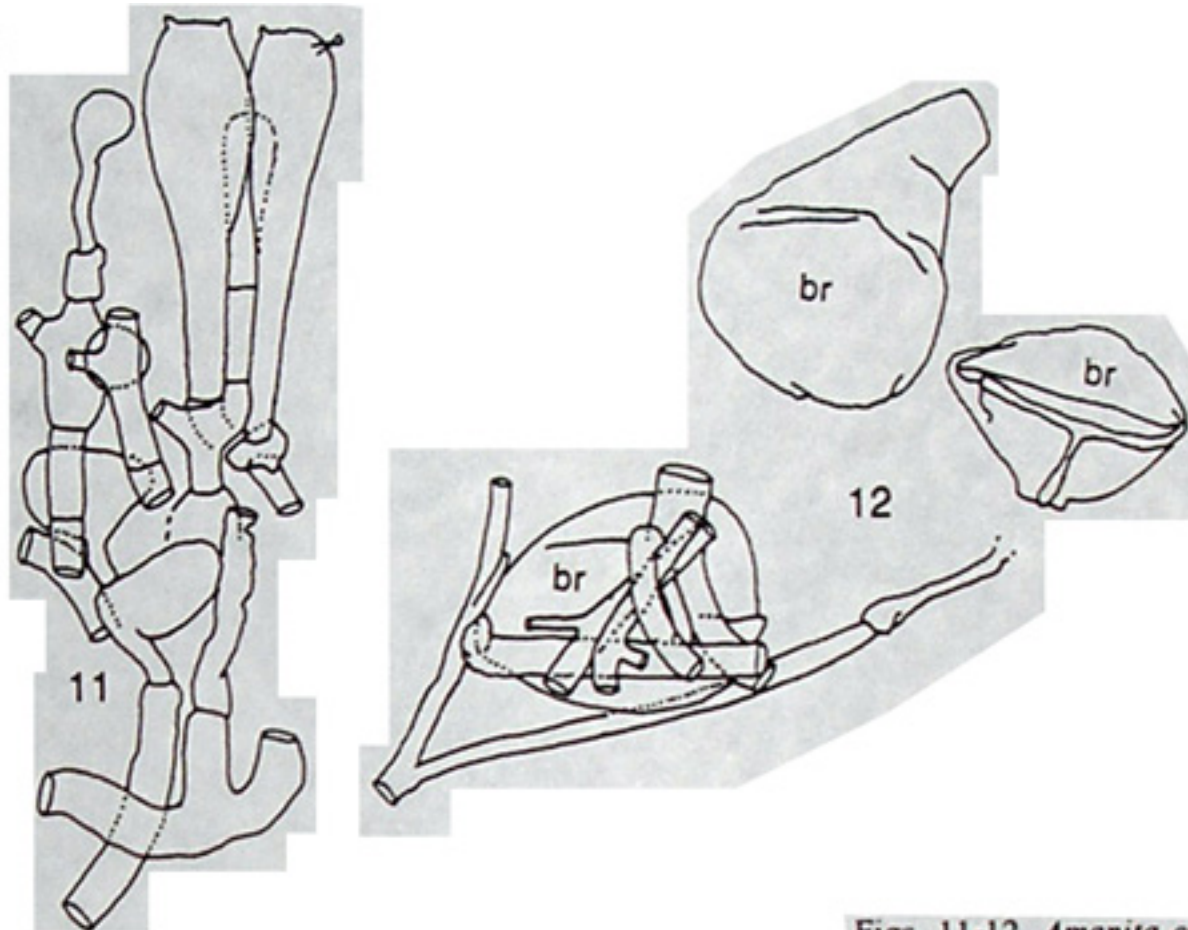
[NOTE: Because of the great size of some of these fruiting bodies, the zonation of older pilei, the relative slowness of the graying reaction of the volva, it is possible that this entity has been called *A. pachycolea* in the past. Likewise, it is possible that this is what Schalkwijk-Barendsen (1991) called *A. umbrinolutea*.]

ODOR indistinct. TASTE mild.

MACROCHEMICAL TESTS: Results according to Breckon (1968)—on exposed context of the lower stipe and bulb unless otherwise noted: Concentrated H₂SO₄ - turning lamellae pink to lilac, but not always; FeSO₄, 15% KOH, Melzer's Reagent - negative; 3% phenol - positive; tincture of guaiac - varying from strongly and rapidly positive to weakly and slowly positive; phenolaniline - rapidly positive. Any variable reactions must be questioned because Breckon had as many as four taxa mixed together among the collections cited under the present species in his thesis.

PILEIPELLIS: 200± μm thick; thin layer at surface gelatinized; upper 40± μm incompletely gelatinized; upper 80 - 95 μm hyaline to pale yellowish; lower portion light brownish orange (mounted in 10% NH₄OH); filamentous, undifferentiated hyphae 2.2 - 8.5 μm wide, criss-crossed, largely uncurving, many subradially arranged, a few containing red-brown granules (mounted in 3% KOH); vascular hyphae not observed. PILEUS CONTEXT: filamentous, undifferentiated hyphae 1.5 - 14.0 μm wide, branching, very loosely interwoven; acrophysalides dominating, subglobose to pyriform to ellipsoid to broadly clavate to clavate, up to 129 × 74 μm; vascular hyphae 6.0 - 17.5 μm wide, loosely coiling. LAMELLA TRAMA: bilateral, with divergence obscured by plentiful hyphae parallel to the hymenial surface and the tangled nature of the subhymenial tree except near the edge of the lamella; central stratum having boundaries somewhat difficult to define because of density of subhymenium and fact that divergence begins within central stratum and many hyphae of the subhymenial base diverge at very shallow angles which are maintained for relatively long distances, sometimes imperfectly rehydrating and then dense and brown to orange-brown, with $w_{cs} = 110 - 145 \mu\text{m}$ in cases of most complete rehydration (65 - 85 μm in most common degree of moderate rehydration, 30 - 55 μm in poorly rehydrating trama); with hyphae of subhymenial base diverging at angles from very shallow to over 60°; filamentous, undifferentiated hyphae 1.8 - 9.8 μm wide, sometimes coiling, interwoven, frequently branching, with central stratum and subhymenial base including intercalary inflated cells [thin-walled, subventricose to ventricose to subclavate to clavate to broadly clavate to irregular, up to 53 × 35 μm (most often about half this width)]; divergent, terminal, inflated cells not observed; vascular hyphae 2.5 - 12.5 μm wide, occasionally branching, infrequent to somewhat common to common. SUBHYMENIUM: $w_{st\text{-}near} = 80 - 140 \mu\text{m}$ in cases of most complete rehydration [(25-) 30 - 80 μm in most common degree of moderate rehydration, 0 - 30 μm in poorly rehydrating trama]; $w_{st\text{-}far} = 110 - 175 \mu\text{m}$ in cases of most complete rehydration (60 - 105 μm in most common degree of moderate rehydration, 35 - 60 μm in poorly rehydrating trama); a complexly interwoven structure comprising frequently septate, frequently branching hyphae, with segments uninflated or partially inflated (or occasionally inflated and then clavate to subpyriform to somewhat irregular, e.g., 19 × 14 μm), with hyphae of the subhymenium occasionally running parallel to the

hymenial surface (sometimes in rather dense clusters) within 10 μm of bases of longest basidia, with basidia often arising from uninflated segments (80% or more of cases examined), but also from any type of cell cited, with 1/2 to 2 1/2 (rarely 3) cells between base of short basidiolate and longest nearby basidium/-ole, with cell immediately below a short basidiolate uninflated ($9.0 - 21 \times (2.5-) 3.2 - 6.8 \mu\text{m}$) to narrowly clavate or with short branch giving rise to second basidiolate ($12.6 - 20 \times 5.8 - 8.8 \mu\text{m}$) to ellipsoid or pyriform ($7.5 - 10.0 \times 7.8 - 11.8 \mu\text{m}$). **BASIDIA:** $54 - 78 \times 8.5 - 19.5 \mu\text{m}$, thin-walled, dominantly 4-, but occasionally 1- or 2-sterigmate; sterigmata up to $16.0 \times 3.5 \mu\text{m}$; clamps rather rare to rather common. **UNIVERSAL VEIL:** *On pileus, upper portion:* filamentous, undifferentiated hyphae $1.5 - 8.2 \mu\text{m}$ wide, occasionally in fascicles, often collapsed; inflated cells dominating, thin-walled, clavate to broadly clavate to subpyriform to ellipsoid, often pale brownish or pale orange-brown, terminal, single, up to $46 \times 33 \mu\text{m}$, collapsed; vascular hyphae not observed. *On pileus, lower portion (adjacent to pileipellis):* hyphae more frequent; all elements extensively compressed. *On stipe about 10 mm above base:* structures similar to those on pileus; inflated cells (collapsed and partially gelatinized) and fragments of same easily dissociated from surface leaving mostly tangled hyphae; inflated cells up to $95 \times 67 \mu\text{m}$, with walls thin or up to $0.8 \mu\text{m}$ thick, with unbroken cells often not pigmented; vascular hyphae $3.0 - 6.0 \mu\text{m}$, scant, fragmentary. **STIPE CONTEXT:** longitudinally acrophysalidic; filamentous, undifferentiated hyphae $1.5 - 11.5 \mu\text{m}$ wide, branching, plentiful; acrophysalides thin-walled, plentiful, up to $271 \times 45 \mu\text{m}$, those of broader diameter often broadening rapidly close to basal septum; vascular hyphae $2.8 - 10.5 \mu\text{m}$ wide, loosely coiling.



Figs. 11-12. *Amanita constricta* (Breckon 302, isotype). 11. Elements of hymenium and subhymenium. 12. Elements of universal veil (interior, near exterior surface) from pileus (crush mount). The letters "br" are used to label brown elements; and "gr," gray elements.

BASIDIOSPORES: [513/26/12] $(7.2-) 9.5 - 12.8 (-19.0) \times (6.2-) 8.2 - 11.5 (-17.8) \mu\text{m}$, (**L** = $(10.3-) 10.4 - 11.7 (-11.8) \mu\text{m}$; **L'** = $11.0 \mu\text{m}$; **W** = $(8.8-) 9.2 - 10.5 (-10.9) \mu\text{m}$; **W'** = $9.9 \mu\text{m}$; **Q** = $(1.0-) 1.04 - 1.25 (-1.56)$; **Q'** = $(1.06-) 1.09 -$

1.17 (-1.18); $Q' = 1.12$), colorless, hyaline, smooth, thin-walled, inamyloid, globose to subglobose to broadly ellipsoid, occasionally ellipsoid, in some specimens frequently lacrymoid, adaxially flattened (often strongly so), often swollen at one end, susceptible to conversion to crassospores on occasion (Tulloss 1-19-03-Ba); apiculus sublateral, cylindrical to truncate-conic, at times quite prominent; contents mono- to multiguttulate to granular; white in deposit.

HABITAT: Single to scattered to gregarious, December to March, along the Pacific Coast of the USA, apparently limited to coastal forest, under hardwoods such as coastal spp. of *Quercus* (e.g., *Q. agrifolia*) and *Arbutus menziesii*, on occasion under *Pseudotsuga menziesii* or in mixed woods of *P. menziesii* and *Q. agrifolia* or under *Umbellularia californica* in an area of mixed *Quercus* and *Umbellularia*. The holotype was collected under *Quercus* and *A. menziesii*.

COLLECTIONS EXAMINED: U.S.A.: CALIFORNIA—Marin Co. - Alpine Lake, 20.xii.1963 Harry D. Thiers 11146 (paratype, SFSU); Muir Woods Nat. Mon., 1.i.1967 D. E. Madden 904 (paratype, SFSU), 25.i.1967 Gary A. Breckon 881 (paratype, SFSU), 31.i.1967 G. A. Breckon 906 (paratype, SFSU). Mendocino Co. - [?]coastal area west of Navarro, C[?] Rd., 19.i.2003 H. Higley s.n. [Tulloss 1-19-03-Ba] (RET), D. Czederpiltz s.n. [Tulloss 1-19-03-Bb] (RET). San Mateo Co. - San Francisco Watershed, 22.xii.1963 H. D. Thiers 11184 (paratype, SFSU), 11.i.1965 H. D. Thiers 12064 (paratype, SFSU), 22.i.1965 G. A. Breckon 302 (holotype, SFSU; isotype, NY), 22.ii.1965 H. D. Thiers 12211 (paratype, SFSU), 6.i.1967 G. A. Breckon & H. D. Thiers [Breckon] 674 (paratype, SFSU). Solano Co. - Green Valley, 1.iii.1968 Walter J. Sundberg 1167 (paratype, SFSU). WASHINGTON[?]-[?] Co. - [?], Riverside Tr., 20.v.1987 Wanda Caruthers s.n. [Tulloss 5-20-87-WC1].

NOTES: Large lacrymoid spores (not uncommon in some specimens) are extremely difficult to measure accurately because the large end tends to sink producing a foreshortening of the spore as viewed (i.e., preventing a lateral view) and making the process of spore measurement for this taxon extremely tedious. Lacrymoid spores were not measured unless they could be viewed fully in focus in optical cross-section in lateral view. This methodological decision tends to produce a lower than actual Q for specimens in which lacrymoid spores occurred with any frequency. In the specimens with lacrymoid spores, subglobose to globose spores were always present and in equal or greater number than the lacrymoid ones. As a consequence, the distribution of Q for spores measured from these specimens can be distinctly bimodal.

The combination of the

- spore size and shape
- strongly strangulate, graying, submembranous volva
- frosty appearance of the center of the pileus (especially in young material)
- shallow subhymenium

separates this species from all known, phenetically similar taxa studied by the author.

Three paratypes of the present species were found by Tulloss (1994) not to be conspecific with the holotype: Breckon 669 was found to represent *A. crassiputamen* Tulloss nom. prov. [treated as *Amanita* sp. C12 in (Tulloss 1994: 19, 74, fig. 14)]. Breckon 684 was found to represent *Amanita* sp. NW5 in (Tulloss 1994: 19, 74, fig. 13). Breckon 865 was found to belong in *A. protecta*.

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