at times becoming hollow near base; *exannulate*; *universal veil* saccate, subcircumscissile to limbate, highest point of limb reaching to 20 - 40^{+} mm from stipe base, up to 5 mm thick at point of connection to stipe, surface white to whitish with ochraceous stains, occasionally surface desiccating and producing thin, submembranous to hardened or shell-like outer layer sometimes having texture of chicken eggshell; interior pale grayish white to grayish, floccose-felted, at times largely carried up onto pileus with outer layer then remaining as limb separated considerably from stipe, occasionally leaving only one or more concentric ridges between volval sac and stipe, occasionally remaining as separate second limb (not *limbus internus*) which may even project above limb formed by outer layer; no noticeable *limbus internus*.

Odor slightly sweet (Wright) or "mild" (Thiers, 1982) or "agreeable" (McMurphy) to faintly unpleasant in age (Tulloss). *Taste* slightly sweet (Wright) or "mild" (Thiers, 1982) or "agreeable" (McMurphy). Wright experienced no symptoms of poisoning after eating about 30 g of the cooked mushroom.

MACROCHEMICAL SPOT TESTS: Spot test for laccase (syringaldazine) - negative. Spot test for tyrosinase (paracresol) - positive except in universal veil, lamellae, marginal pileus context, and very base of stipe. Phenol on stipe: wine-red. KOH on pileus: no reaction. Meixner test (Vergeer, 1986) negative for amatoxins—unreactive or dull orangish or orange-reddish with a yellow ring around the acid drop. Results according to Breckon (1968)—on exposed context of the lower stipe and bulb unless otherwise noted: 10% $FeSO_4$ - yellow-brown; 15% KOH - negative; conc. KOH - pale yellow; Melzer's reagent - negative; 3% phenol - positive; phenolaniline - positive; tincture of guaiac - slowly and very weakly positive. (Test voucher: Tulloss 1-3-87).

PILEIPELLIS: up to 560 µm thick, not having clear boundary with pileus context; filamentous, undifferentiated hyphae 2.1 - 3.5 µm wide, frequently branching, interwoven, gelatinizing near surface. PILEUS CONTEXT: filamentous, undifferentiated hyphae 3.5 - 10.5 µm wide, branching, interwoven, with lengthy thick-walled (wall thickness here and below to 1.2 µm except as noted) terminal or subterminal segments inflated up to 28 µm wide; inflated cells thick-walled, plentiful, terminal, singly or in chains, subglobose to pyriform to clavate to elongate to irregular, up to 106 × 63 µm (larger cells more often elongated than smaller ones); vascular hyphae 2.5 - 5.0 µm wide, branching, common. LAMELLA TRAMA: bilateral, with w_{cs} = 135 - 185 µm (or 55 - 80 µm, in cases of imperfect rehydration); angle of divergence shallow; central stratum rather broad and a tangle of coiling, interweaving hyphae; filamentous, undifferentiated hyphae 3.5 - 5.6 µm wide, branching, with some inflated intercalary cells; inflated cells of subhymenial base up to 70 × 24.5 µm, thin-

walled, intercalary, in three to four layers through which weave hyphae giving rise to subhymenium; vascular hyphae 3.5 - 4.9 µm wide, uncommon; clamps rare. SUBHYMENIUM: w_{st}-near = 55 - 90 (-100) µm; w_{st}-far = 75 - 125 µm; with basidia arising from branching chains of uninflated or slightly inflated short hyphal segments, with basidia also arising directly from some of larger inflated cells of subhymenial base. BASIDIA: 47 - 92 × 10.0 - 17.5 µm, clavate to narrowly or very narrowly clavate, 4-spored, rarely 3- or 2-spored, thin-walled, continuing curve of divergent trama elements for most of length, apical portion finally perpendicular to central stratum; clamps not observed. UNIVERSAL VEIL: *On stipe base, exterior surface*: tissues difficult to reinflate; filamentous, undifferentiated hyphae 4.2 - 5.9 µm wide, dominating, gelatinizing, branching, disorderly, intertwining or in intertwining fascicles, some with intercalary and/or terminal segments slightly inflated to 19.6 µm wide; inflated cells terminal, clavate (up to 77 × 25 µm) and pyriform to lachrimiform (up to 65.1 × 44.1 µm); vascular hyphae 3.5 - 4.2 µm wide, occasional. *On stipe base, interior*: filamentous, undifferentiated hyphae 3.1 - 8.0 µm wide, branching, tightly coiled or twisted, with terminal and subterminal sequences of hyphal segments often inflated up to 14.0 µm wide; inflated cells thin- or thick-walled, plentiful, terminal, subglobose to ellipsoid (up to 64 × 50.5 µm) and clavate (up to 126 × 33 µm); vascular hyphae $4.9^{\pm}$ µm wide, scattered. *On pileus in region immediately above pileipellis*: dominated by globose to subglobose to ovoid inflated cells, terminal, singly or in chains of up to 4, with walls thin or up to 1.5 µm thick, up to 61.6 × 52.5 µm; filamentous, undifferentiated hyphae 2.1 - 8.4 µm wide, extensively branching, sometimes gelatinizing in thin region just above pileipellis leaving only inflated cells in that region. *On pileus, further from pileipellis*: filamentous, undifferentiated hyphae more curved and with some coiling as in veil at stipe base, with terminal and subterminal segments inflated to 14 µm wide; terminal subglobose to clavate cells thick-walled, up to 56 × 29.4 µm. STIPE CONTEXT: longitudinally acrophysalidic; filamentous, undifferentiated hyphae, 2.8 - 4.9 µm wide, branching; acrophysalides up to 215 × 52 µm (most narrower), dominating, thick-walled; vascular hyphae 10.5 - 12.6 µm wide, uncommon; clamps very rare.

BASIDIOSPORES: [428/21/12] (8.7-) 9.5 - 13.0 (-20.5) × (7.3-) 8.7 - 11.5 (-16.2) µm, (**L** = 10.3 - 12.3 (-12.4) µm; **L'** = 11.2 µm; **W** = (9.0-) 9.1 - 10.8 (-11.2) µm; **W'** = 9.9 µm; Q = (1.0-) 1.03 - 1.27 (-1.43); **Q** = (1.07-) 1.10 - 1.19; **Q'** = 1.13), inamyloid, thin-walled, hyaline, smooth, globose to subglobose to broadly ellipsoid, occasionally ellipsoid, sometimes slightly expanded at one end, frequently adaxially flattened or slightly so; contents guttulate; apiculus sublateral, truncate conic; white in deposit.

Distribution and habitat: Solitary to subgregarious. California: At up to 800 m elev. "Nearly buried in leaves under trees" or "solitary in soil under Oak and Laurel" or in litter under *Quercus agrifolia* or with pure stand of *Pinus radiata*. According to Thiers (1982), this species is "[s]olitary in conifers and hardwoods. Apparently rare in California, but recorded from the northern coastal forests and from the foothills of the Sierra Nevada."

Collections examined: **U.S.A.**: CALIFORNIA—Los Angeles Co. - Santa Catalina Isl., Grand Cyn., 27.xii.1920 L. W. Nuttall 988 (paratype, F, as "*A. velosa*"); Santa Monica Mtns., Cold Crk. Cyn. Preserve, Stunt Cyn., 3.i.1987 Barry Silver *s.n.* [Tulloss 1-3-87-BS1, Wright 1383A] (holotype, NY), 10.i.1987 B. Silver *s.n.* [Wright 3701] (paratype, RET). Marin Co. - Muir Woods Nat. Mon., 15.i.1967 G. Breckon 865 (SFSU as paratype of *A. constricta*). Riverside Co. - Santa Ana Mtns., El Cariso, 17.ii.1987 G. Wright 3701A (paratype, RET); Slaughterhouse Cyn., Clinton Keith Rd., 3.iii.1987 G. Wright 3712 (paratypes: DTJ, RET, XAL). San Mateo Co. - Pacifica, 7.xii.1984 Mycol. Soc. San Francisco member *s.n.* [H. D. Thiers 48390] (SFSU as "*A. inaurata*"). Border of San Mateo & Santa Clara Cos. - Stanford Univ., Los Trancos Crk., 16.i.1916 James McMurphy 200 (BPI as "*Amanita sp.*"), 17.i.1918 J. McMurphy *s.n.* (BPI as "*A. vaginata*"). Santa Barbara Co. - Santa Ynez Mtns., Los Prietos Campg., 30.iii.1979 Florence Nishida *s.n.* [Wright 1383] (paratype, RET). Sonoma Co. - Helen Putnam Region. Pk., Petaluma, 22.xii.2004 Ron Pastorino 12-22-04A (*in herb.* R. Pastorino; RET)

DISCUSSION

The most remarkable macroscopic feature of *A. protecta* is its universal veil. In some specimens the veil appears to have a tough outer layer covering a second layer of floccose-felted material which is separated from the pileus by a third, pulverulent layer. However, there are really only two layers. Microscopically, the sometimes hardened surface is revealed to be a desiccated layer of tissue nearly identical to that underlying it; the portion of the veil nearest the pileus is composed mostly of small inflated cells, sometimes in chains, which make up the fine pulverulent layer visible where no volval patch is present. In *Amanita* section *Vaginatae*, this form of universal veil is known only from the present species.

In the field, if the limb of the volval sac were completely broken away, one might mistake this species for a member of Section *Amanita* close to *A. pantherina* because the specimen would appear to have a cothurnate, even abrupt, bulb; however, the peculiar character of the volval material remaining on the pileus, the dark gill margins, and the dark fibrils on the exannulate, completely elongating (bulbless) stipe should serve to prevent such an error.

Amanita constricta can be distinguished from *A. protecta* in the field by the former's having a sulcate to tuberculate sulcate pileus margin and a thinner, constricted and flaring, submembranous universal veil that reaches up one third to one half of its stipe and bruises reddish or salmon when moist. There is no tendency to ochraceous staining in the tissues of *A. constricta*; the lamellae of *A. constricta* turn gray or grayish with age; and its universal veil lacks a pulverulent inner layer. Moreover, clamps can be found on basidia of *A. constricta*; its basidia are shorter; and its spores are slightly smaller[?]. The anatomy of the universal veils also differ markedly in the two species.

Amanita pseudovaginata Hongo has some macroscopic similarities to *A. protecta* (gray material on stipe and gill margins and a relatively robust stipe base), but is smaller according to Hongo (1983). Also, the spores of *A. pseudovaginata* are much narrower (7.0 - 9.0 (-9.5) µm) and the basidia shorter (40 - 58 µm).

Nuttall 988 was determined originally to be *A. velosa*; this latter species has a pallid, yellowish to orangish (or occasionally white) pileus; a relatively pointed stipe base; narrower spores; no marked tendency to ochraceous staining in the tissues; a more membranous volva which does not break up into pulverulence and floccose patches on the pileus and which tends to leave a single membranous calyptra over the disc; etc.

The upper limit for the length of basidia in *A. protecta* considerably exceeds that for any taxa in section *Vaginatae* treated by Jenkins (1986). —R. E. Tulloss

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