

MYCOTAXON

Volume LXXIX, pp. 289-306

July-September 2001

NEW SPECIES OF AMANITA FROM THE DOMINICAN REPUBLICA, GREATER ANTILLES

ORSON K. MILLER, JR.

Dept of Biology, Virginia Polytechnic Institute
and State University, Blacksburg, VA 24061
E-mail: Orsonk@cs.com

D. JEAN LODGE¹

Center for Forest Mycology Research, U.S.D.A. Forest Service,
P.O. Box 1377, Luquillo, PR 00773-1377, USA
E-mail: djlodge@coqui.net

ABSTRACT

Three new species of *Amanita* are described from the Dominican Republic on the island of Hispaniola. One of the new species is in subgenus *Lepidella* section *Amidella* and two are in subgenus *Amanita*. One of the latter two species is in section *Amanita*, but the other cannot be placed below subgenus.

Key words: *Pinus*, Hispaniola.

¹ The Forest Products Laboratory in Madison is maintained in cooperation with the University of Wisconsin, while the lab in Puerto Rico is maintained in cooperation with the USDA-Forest Service International Institute of Tropical Forestry. This article was written and prepared by a U.S. Government employee on official time, and the information is therefore in the public domain and not subject to copyright.

INTRODUCTION

The Island of Hispaniola, including the Dominican Republic, has a single native pine *Pinus occidentalis* Swartz which grows in extensive areas from about 850 to nearly 2500 m elev. which is the easternmost extent of native pine in the Caribbean. It is either scattered or in nearly pure stands. It has been planted in a few areas, but not extensively. Extensive natural populations of *P. occidentalis* occur on over 335,000 hectares throughout the mountains of Hispaniola (Darrow & Zanoni, 1993). It is a unique situation in that it is the only ectomycorrhizal conifer species throughout its range in the Dominican Republic with only very restricted additional distributions in Cuba. The new species reported in this paper have all been under or near *Pinus occidentalis* and are putatively ectomycorrhizal with it.

MATERIALS AND METHODS

Color comparisons made using Kornerup and Wanscher (1967) are designated Met. (e.g., Met 6E-4 indicates the plate, row, and color block). In some cases, pileus colors were recorded using Cailleux (1948) and are noted as Caill. (e.g., Caill. T73 indicates row T, Color block 73). A few others were recorded as Ridgway (1912) color names as reproduced by Smithe (1975) and are given in capitalized form, e.g. (Drab Gray) and accompanied by Munsel color notations in parentheses (e.g., 0.1Y 6.8/2.1). Collection numbers preceded by CFMR DR- refer to a unique number in the database for the Basidiomycetes of the Greater Antilles project; ledger numbers are also presented, if assigned. Chemical reagents including Melzer's solution, Gum-guaiac, 2% Phenol, and Ferric sulphate were used for spot testing tissue samples when appropriate. Drawings were made from mounts in 3% KOH or Melzers solution. Smell and taste were recorded when possible from fresh material. The E value is the length divided by the width of the basidiospore and the E_{mean} value is the mean of E of N = 31 spores unless otherwise stated. For color images of several of the taxa described here see:
<http://www.cortland.edu/NSF/ga.html>.

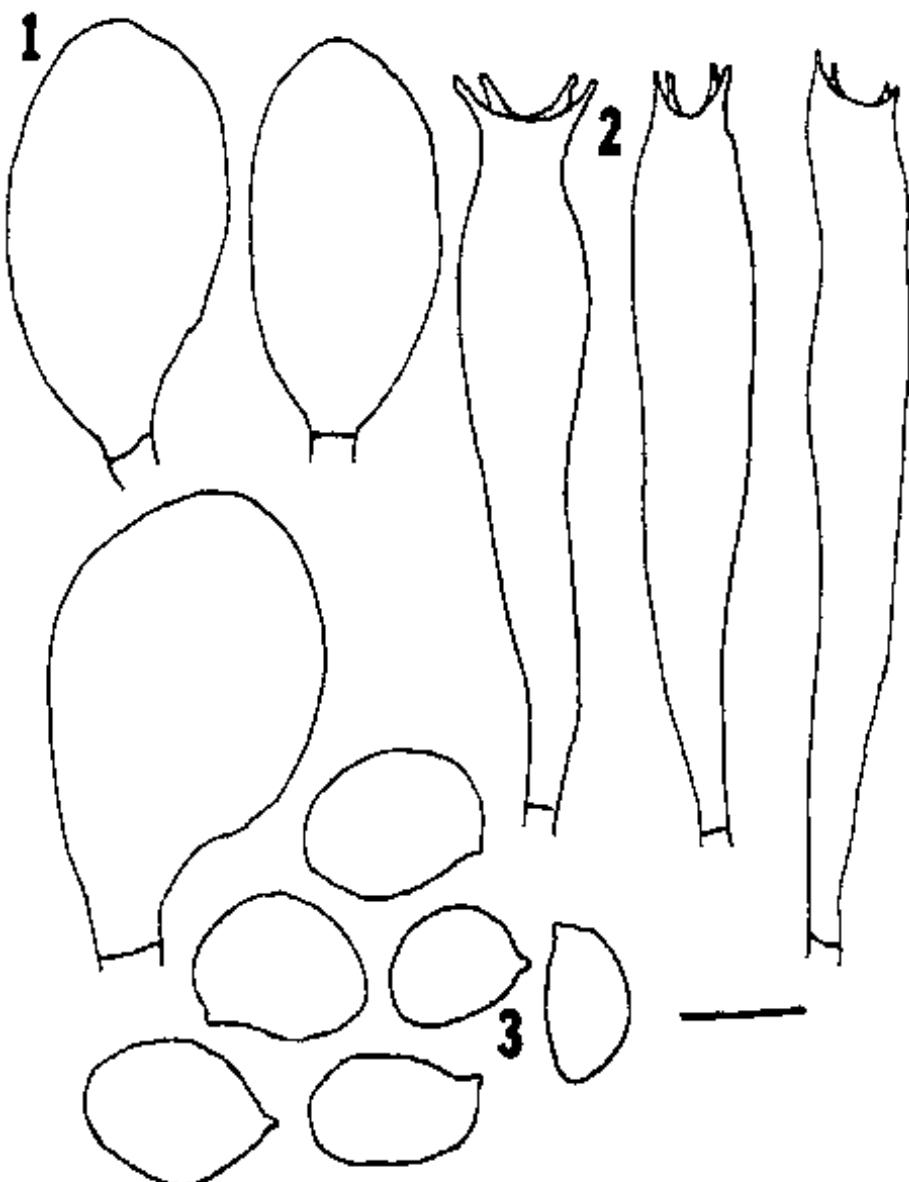
TAXONOMY

Amanita occidentalis O.K. Mill. & Lodge sp. nov. Figs. 1-3, 10-12, 15.

Pileus 45-65 mm latus, late convexus, siccus, pallide alutaceus in superficie reliquiis volvae universalis in maculis conspicuis albis vel sordide et pallide brunneolis ornatus, in margine obscure striatus. *Lamellae* fere liberae, modice latae, obscure albae, lamellulis sparsis, curtis. *Stipes* 48-100 mm longus, supra volvam (4-) 8-25 mm latus, in superficie fibrillis elevatis primo brunneolis aetate albescentibus ornatus; volva saccata, alba aetate colore brunneo tincta. *Contextus* mollis, in pileo atque stipite superiore albus, in parte inferiore colore bruneo tinctus, in centro infirmus. Odor gratus sed non distinctus.

Pileipellis mixocutem formans, hyphis filamentosis 2.4-4.5 μ m diam., in superficie intertextis vel fere rectis, tenuitunicatis, simplici-septatis, in 3% KOH atque solutione Melzeri hyalinis vel luteolis reagentibus praedita. *Pileitrama* e hyphis tenuitunicatis, hyalinis, filamentosis atque cellulis interspersis, 2.7-44.0 μ m diam., inflatis, tenuitunicatis composita. *Trama Lamellaris* e hyphis divergentibus, tenuitunicatis, filamentosis atque cellulis 2.7-44.0 um diam., subvesicularibus vel inflatis composita. *Basidia* 44-53 x 9.8 - 11.7 um diam., longe clavata, tenuitunicata, hyalina, 4-spora. *Basidiosporae* (9-)10-14 x 5.5-9.0 μ m ($E_m = 1.68$: $E = 1.47-2.03$) late ellipticae, tenuitunicatae, in solutione Melzeri amyloideae. **Holotypus** sub *Pinus occidentalis* Republica Dominicana, La Vega Prov., Valle Nueva, 2200 m elev., O.K. & H.H. Miller & D. J. Lodge, OKM 27082 lectus.

Pileus 45-65 mm broad, broadly convex, moist, brownish orange, Tawny (5.0 YR 5.0/7.0) at the disc to Raw Sienna (7.5 YR 5.5/9.0) fading to pale orange with pinkish tint, Pale Pinkish Buff over the margin, light tan ground color with conspicuous white to sordid light orange brownish (Tawny Olive. 1.0 Y 5.2/4.5); patches of universal veil scattered over the surface; margin with short obscure striations. *Lamellae* nearly free, medium broad, dull white with scattered short lamellulae. *Stipe* 48-100 mm long, (4-)8-25mm wide above the volva,



Figures 1-3, *Amanita occidentalis*. Fig. 1. Cheilocystidia. Fig. 2. Basidia. Fig. 3. Basidiospores. Bar = 10 μm

enlarging to a clavate base, with raised brownish surface fibrils which are nearly white in age. *Annulus* superior, friable, disappearing with age. *Volva* saccate, white, tinted orange-brown in age. *Context* soft, white in cap and upper stipe, tinted brown below with a soft enteria *Odor* pleasant but not distinctive.

Pileipellis an ixomixocutis with filamentous hyphae 2.4–4.5 μm diam interwoven to nearly erect at the surface, thin-walled, simple septate, hyaline to yellowish in 3% KOH and Melzers solution. *Pileitrama* a combination of thin-walled, hyaline, filamentous hyphae interspersed with large inflated thin-walled cells 2.7–43.0 μm diam. *Lamellar trama* divergent, a combination of thin-walled filamentous hyphae and swollen

to inflated cells 2.7–44.0 μm diam. *Subhymenium* a textura intricata of cells 7–13 x 5–8.5 μm diam, thin-walled, hyaline and several cells thick *Universal veil* in cross section reveals interwoven hyphae 4.2–15 μm diam, dense on the inner face with infrequent ovoid to swollen cells (up to 106 x 33 μm) toward the middle, thin-walled, simple septate, hyaline in 3% KOH. *Cheilocystidia* 25–27 x 17–22 μm , ovoid to globose, thin-walled, hyaline usually in a single layer. *Basidia* 44–53 x 8.0–11.7 μm diam long clavate, thin-walled, hyaline, 4-spored. *Basidiospores* (9–)10–14 x 5.5–9.0 μm ($E_m = 1.68: E = 1.47\text{--}2.03$), broadly elliptical, thin-walled, hyaline in 3% KOH and dark blue (amyloid) in Melzers solution.

Habit, habitat and distribution. On ground under pure *Pinus occidentalis* stand near the Fundación Moscoso Puello cabin at Valle Nuevo, 2200 m elev. Fruiting from November to January.

Material examined. Dominican Republic: La Vega Prov., Valle Nuevo, 21 Nov. 1997, 2200 m asl, coll. D.J. Lodge and O.K. and H.H. Miller OKM 27082 (HOLOTYPE) (CFMR DR-1250, JBSD 88204,); 30 July 1996, coll. D. J. Lodge CFMR DR-104 (CFMR, JBSD 88205).

Observations. The faint striations on the margin were not plicate-striate and were often incomplete. The volval coloration was difficult to judge on the old specimens? but it was orange-brown (apricot color) in DR- 104, which was young material. In addition, the annular zone noted on the young specimens of DR-104 was not present in older specimens. A comparison of the volval tissue (Fig. 10), the spore shape and size, and the thick saccate volva (Fig. 15) leaves no doubt that both collections represent the same species in two different stages of maturity. Both fruitings occurred in the same area on the forested road mentioned above in January and again in November.

In the North American literature, this taxon would be in Section *Amidella* according to Jenkins (1986), and Subsection *Amidellae* (Gilb.) Drehmel, Vilgalys & Moncalvo according to Dremel et al. (1999). Species in *Amidella* are characterized by a combination of friable volval remains on the pileus, lack of strong striations on the cap margin, broadly elliptical amyloid spores, and a saccate volva. The only species which seems close

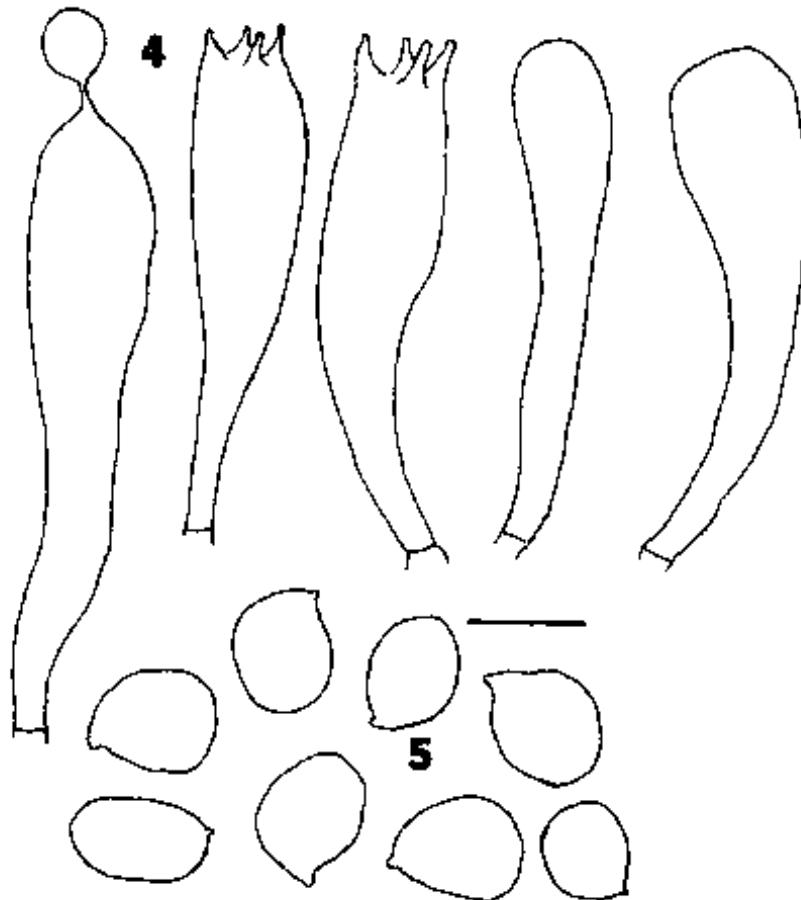
to *A. occidentalis* is *A. volvata* (Pk.) Lloyd but the spores of that species are smaller and narrower ($8.6\text{--}10.2 \times 5.5\text{--}7 \mu\text{m}$ with an $E_m = 1.48$) than in our taxon which is mostly $10\text{--}14 \times 5.5\text{--}9.0 \mu\text{m}$ with an $E_m = 1.68$.

Amanita circinata* O.K. Mill. & Lodge *sp. nov. Figs. 4-5, 11-12, 16

Pileus 40-82 mm latus, convexus, ad marginem involutus, siccus, impolitus, subsericeus, rutilascens vel pallide aurantiacus vel carneus, verrucis bubalinis vel flavis pyramidalibus ornatus. *Lamellae* liberae, aggregatae, albae, lamellulis uniformibus praeditae, aequimarginatae. *Stipes* 55-95 x 12-22 mm, siccus, albus, ad basem bulbosus annulis concentricis pallide bubescentibus vel ochraciusculis ornatus; annulus didymus, superior fibrosus, inferior membranaceus. *Pileipellis* ex hyphis laxe intertextis, filamentosis, tenuitunicatis $2.5\text{--}7.6 \mu\text{m}$ diam., in solutione 3 % KOH hyalinis, in solutione Melzeri luteolis reagentibus composita. *Pileitrama* e hyphis intertectis usque $18 \mu\text{m}$ diam. atque cellulis turgidis, irregularibus vel ovoideis in solutione KOH hyalinis, in Melzeri aurantiaci-brunneis reagentibus composita. *Lamellae* e hyphis divergentibus hyphis tramae similibus compositae. *Volva universalis* ex cellulis globosis vel plerumque ovoideis, tenuitunicatis $(18\text{--})22\text{--}55 \times (10\text{--})15\text{--}30 \mu\text{m}$ atque hyphis sparsis, filamentosis $2.5\text{--}7 \mu\text{m}$ diam immixtis composita. *Volva* $(9\text{--})12\text{--}27 \times (5.5\text{--})7\text{--}13 \mu\text{m}$ diam, partialis e cellulis ovoideis, fusiformibus vel irregulariter turgidis atque hyphis aequinumerosis, filamentosis $3\text{--}8 \mu\text{m}$ diam composita. *Basidia* $35\text{--}46 \times 8\text{--}10.5 \mu\text{m}$, clavata, tenuitunicata, 4-spora, hyalina. *Basidiosporae* $7.5\text{--}11.5 \times 6.5\text{--}8.5 \mu\text{m}$ ($E_m = 1.32$; $E=1.15\text{--}1.46$) brevi-ellipticae vel subglobosae, tenuitunicatae, in solutione KOH atque Melzeri hyalinae reagentes.

Holotypus sub Pino occidental, Las Placetas, Santiago Prov., Republica Dominicana, 28 Jan. 1998, coll. D. J. Lodge, G. Dobler, M. Castellano, J. Trappe, J.G. Torres & R. Ferreras, Leg. Lodge DJL-43, CFMR DR-587 lectus.

Pileus 40-82 mm broad, convex with enrolled margin, pale Burnt Orange, Orange-Rufus (2.5 R 5.0/10.0) to Flesh Ochre (2.5 YR



Figures 4-5. *Amanita circinata*. Fig. 4. One and four spored basidia and basidioles. Fig. 5. Basidiospores. Bar = 10 μm

6.6/8.0) with Buff-Yellow (2.5 Y 8.0/7.0) pyramidal warts, dry, dull and slightly silky. *Lamellae* free, white, 2 per mm; one length of lamellulae; edges even. *Stipe* 55-95 x 12-22 mm, white above ring, slightly felty. Annulus double, inferior, upper veil fibrous, white; lower veil membranous, white with a yellow margin. *Volval elements* over base as five to six Light Drab concentric rings on Drab Gray ground above; base clavate to sub-bulbous, slightly cleft, white. Odor not distinctive.

Pileipellis of loosely interwoven, filamentous, thin-walled hyphae

2.5–7.6 μm diam, hyaline in 3% KOH light yellow in Melzers solution. *Pileitrama hyphae* similar but larger, up to 18 μm diam, some swollen, irregular to ovoid cells, hyaline in KOH, orange-brown in Melzers solution (many hyaline cells but some pigment in cells and cell walls). *Lamellae* of divergent hyphae, similar to trama. *Universal veil* a combination of 50% globose to mostly ovoid thin-walled cells 9–24 x 7–14 μm intermixed with 50% filamentous hyphae 1.5–4 μm diam. *Annulus* a combination of ovoid, fusiform, to irregular swollen cells (9–) 12–27 x (5.5–)7–13 μm diam. and an even number of filamentous hyphae 1.5–4.5 μm diam. *Basidia* 35–38 x 10 μm clavate, thin-walled, 4-spored, hyaline. *Basidiospores* 7.5–11.5 x 6.5–8.5 μm ($E_m = 1.32$: $E=1.15-1.46$), subglobose, rarely globose, thin-walled, hyaline in Melzers solution and 3% KOH.

Habit, habitat, and distribution. Single or several on the ground under *Pinus occidentalis*, fruiting in January.

Material examined. Dominican Republic, La Vega Prov., above Manabao, Jose Cruz's farm, 19° 4' 46" lat., 70° 48' 11" long., 29 Jan. 1998; coll. D.J. Lodge, G. Dobler, M. Castellano, & J. Trappe, Leg. Lodge DJL-59, CFMR DR-603 (CFMR; JBSD 88663) (HOLOTYPE); Santiago Prov., Las Placetas, 1100 m elev., 19° 13' 27" lat., 70° 53' 27" long., 28 Jan. 1998, coll. D.J. Lodge, G. Dobler, M. Castellano, J. Trappe, DR-603. Santiago Prov., La Placeta, Jan. 28, 1998, D. J. Lodge, G. Dobler, M. Castellano, & J. Trappe, J.G. Torres & R. Ferreras, Leg. Lodge DJL-43, CFMR DR-587 (CFMR, JBSD 88204).

Observations. The persistent pyramidal warts on the pileus and 5–6 persistent rings over the clavate bulb (Fig. 16) make this taxon instantly recognizable when fresh or dried. The similar basal rings in *Amanita muscaria* are only 2 to 3 on the upper bulb. The non amyloid spores place it in the Subgenus Amanita section Amanita. A survey of the literature does not reveal a similar taxon in papers by Jenkins (1986), Pelger (1983, 1977), nor in Tulloss, Ovrebo, & Halling, (1992) or the various papers of Tulloss.

Amanita cruzii O.K. Mill. & Lodge *sp. nov.* Figs. 6-9, 13-14, 17-18.

Pileus (30-)40-80 mm latus, conicus, convexus vel late convexus, siccus, in statu juvenili volva universalis alba, tenui, exteriore praeditus, primo in tota superficie verrucis densis, albis, pyramidalibus in locis non profunde depressis dispositis ornatus, cito abrasus volvam interiore, pulveraceam, ferrugineam (Met 6 C-D 7 usque Met 7 D6-7) superficiem totam cooperientem aperiens; color pilei pallide aurantiacus, ad marginem primo reliquiis sparsis volvae partialis. *Lamellae* liberae, modice latae, subdistantes, ad marginem minute fimbriatae, albae. *Stipes* 55-90mm longus 4-13 (-20) mm latus, albus, bulbum basalem versus expansus 17-28mm latus, supra bulbum annulis texturae elevatae atque in superficie reliquiis volvae universalis ferrugineis, pulveraceis praeditus. *Volva partialis* in apice stipitis evanescens, cito delapsa, in superficie inferiore ferruginea, pulveracea, in superiore alba, lamellis striatis praedita. *Contextus* firmus, albus, in dimidio inferiore stipitis in centro medullosus. Odor non distinctus vel leniter raphani vel *Solani tuberosi* L.

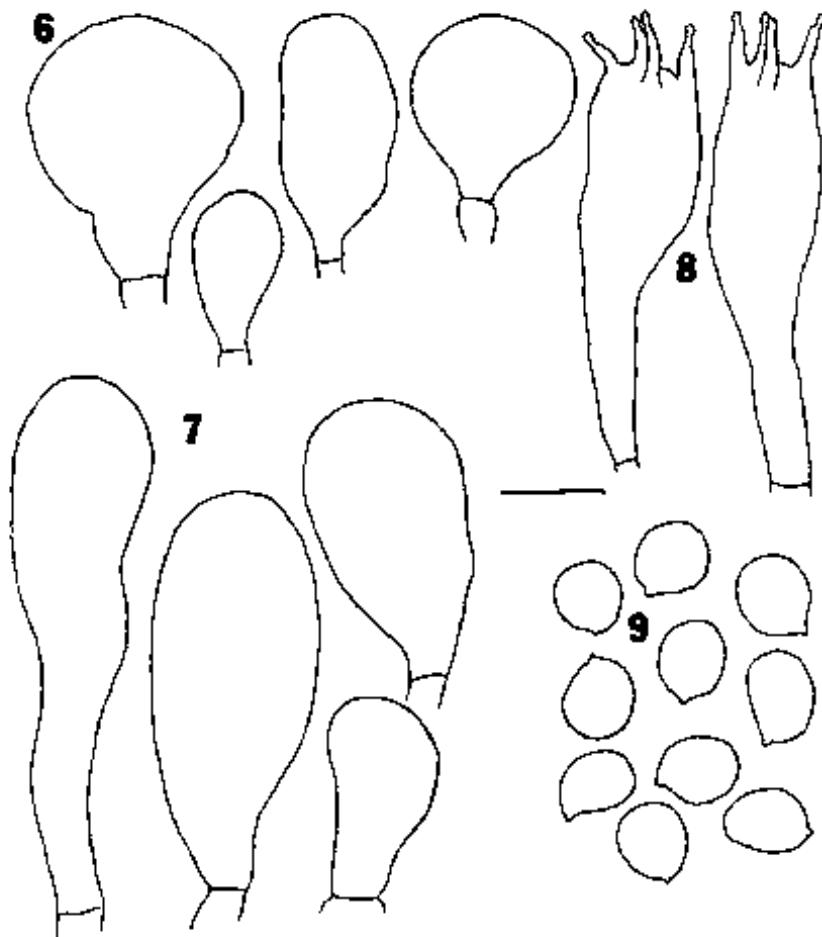
Pileipellis trichodermium e cellulis terminalibus, clavatis, capitatis, globosis vel irregularibus, 21-52 x 7-21 μm latis compositum formans, e subcute intertexta, filamentosa, tenuitunicata e hyphis hyalinis 3-6 μm diam composita exorientem. Trama lamellaris e hyphis divergentibus 3.4-11 μm diam, tenuitunicatis, hyalinis composita. *Volva universalis* tenuis. *Volva exterior* alba, verrucis pyramidalibus e cellulis ovoideis, ellipticis vel pyriformibus compositis ornata, hyphis sparsis, tenuitunicatis, filamentosis, 4-6.5 μm diam. praedita. *Volva interior* stratum ulveraceum, brunneum e cellulis ovoideis vel horizontaliter bicapitatis 19-49 x 10-26 μm diam atque hyphis filamentosis, hyalinis 1.7-4.0 μm compositum formans. *Volva partialis* e cellulis ovalis, ellipticis vel globosis, saepe horizontaliter bicapitatis, tenuitunicatis 19-49 x 10-26 μm diam atque hyphis filamentosis, tenuitunicatis, hyalinis 2-3.5 μm diam immixtis composita. *Cheilocystidia* 15-31 x 7.5-20 μm , pyriformia, clavata vel globosa, tenuitunicata, in 3 % KOH hyalina reagentia. *Basidia* 43-45 x 10-12 μm diam, clavata, 4-spora. *Basidiosporae* 7-9 x 6-7 μm ($E_m = 1.26$; $E = 1.02-1.50$) subglobosae vel late ellipticae, hyalinae, tenuitunicatae, in solutione Melzeri non

amyloideae. Fibullae nullae

Holotypus in Re publica Dominicana, Santiago Prov., San Jose del Les Matas, La Celestina Project, Nov. 24, 1999, O.K. & H. Miller OKM 27706 lectus.

Pileus (30-) 40–80 mm broad, convex to broadly convex, dry; *universal veil* duplex, buttons have a thin, membranous, white outer layer with pyramidal white warts which are centered within shallow depressions, and are dense over the disc, soon sloughing off to reveal a powdery, rusty brown (Met 6 C-D7 to Met 7D 6–7) inner veil which completely covers most surfaces; in age both veils give way to a smooth light orange (Met 6A2) ground color; in some specimens raised white squamules remain over the disc; margin at first with scant remains of the partial veil. *Lamellae* free, moderately broad, subdistant, white; with two lengths of lamellulae; margin minutely fimbriate. *Stipe* 55–90 mm long, 4–13 (-20) mm wide, expanding toward the basal bulb; *basal bulb* 17–28 mm wide, white with rings of raised volval tissue above the bulb, with even to patchy rusty brown powdery surface remnants of the inner universal veil. *Partial veil* duplex, located at stipe apex, evanescent, falls away or is appendiculate for a while; lower layer is composed of inner universal veil material, rusty brown and powdery as on the pileus surface, attached just at the apex; upper layer white, with lamellar striations, lacking powdery material. *Context* firm and white throughout except for the lower half of the stipe which is white and pithy in center, *Odor* indistinct, faint, resembling raddish or potato.

Pileipellus a loose trichodermium of clavate, capitate, globose to irregular terminal cell 21–52 x 7–21 μm , which arise from an interwoven, filamentous, thin-walled subcutis of hyaline hyphae 3–6 μm diam. *Pileitrama* of loosely interwoven hyphae 3.4–10 (-24) μm diam, thin-walled and hyaline. *Lamellar trama* of divergent hyphae 3.4–11 μm diam, thin-walled, hyaline. *Clump connections* lacking in all tissue.



Figures 6-9. *Amanita cruzii*. Fig. 6. Cheilocystidia. Fig. 7. Trichodermial cells of the pileipellis. Fig. 8. Basidia. Fig. 9. Basidiospores. Bar = 10 μm .

Universalveilduplex, thin, white outer veil with pyramidal warts, ovoid, elliptic to pear shaped cells 16–68 x 13–33 μm ($E_s = 1.58$; $E = 1.06$ –3.47) thin-walled, hyaline with scattered thin-walled, filamentous hyphae; inner veil a powdery brown layer of ovoid, rarely globose to dumbbell shaped, cells 19–49x 10–26 μm diam [$E_m = 1.76$; $E = 1.0$ –3.1] intermixed with about 20% filamentous hyaline hyphae 1.7–4.0 μm in

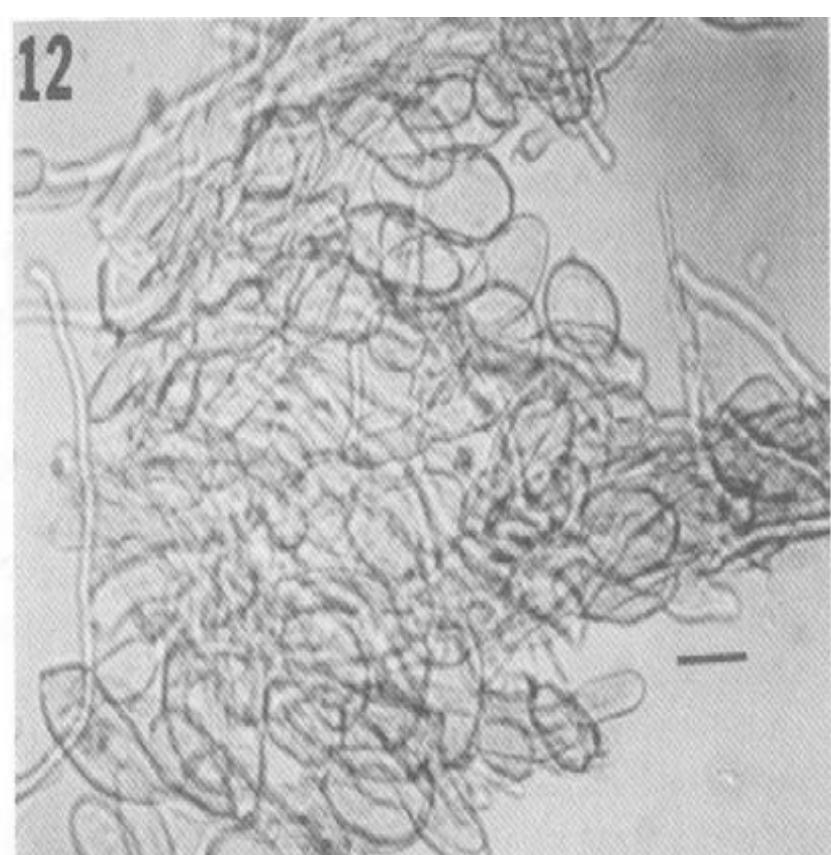
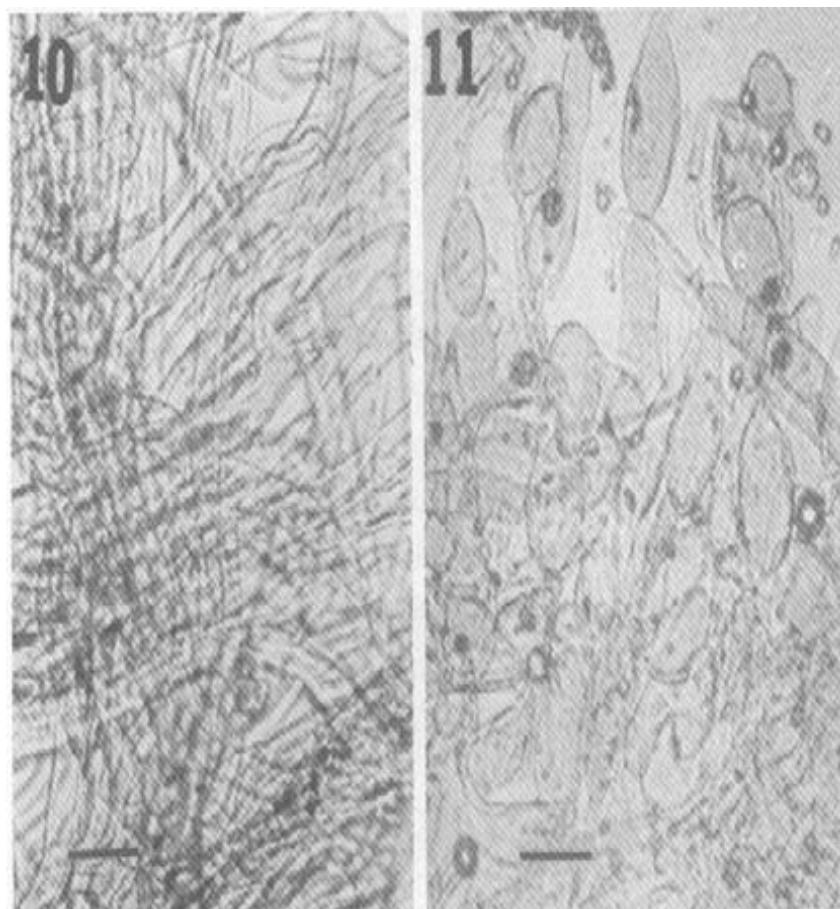
diam. *Partial veil* of oval, elliptical to globose, often dumbbell shaped, thin-walled cells 19–49 x 10–26 μm diam [$E_m = 1.76$: 1.0–3.1] intermixed with 45% filamentous, thin-walled, hyaline hyphae 2–3.5 μm diam, branched and simple septate in 3% KOH. *Cheilocystidia* 15–31 x 7.5–20 μm wide, pyriforme, clavate, to globose, thin-walled, hyaline in 3% KOH. *Basidia* 43–45 x 10–12 μm , clavate, 4-spored, thin-walled, hyaline in 3% KOH. *Basidiospores* 7–9 x 6–7.5 μm ($E_m = 1.26$; $E = 1.02$ –150) subglobose to broadly ellipsoid, hyaline, thin-walled, non-amyloid in Melzer's solution and hyaline to light yellow with a large central yellow oil body in 3% KOH.

Habit, habitat and distribution: single or several fruiting bodies under *Pinus occidentalis*, in mixed woods or plantations, La Vega and Santiago Provences, Dominican Republic. Fruiting from November to January.

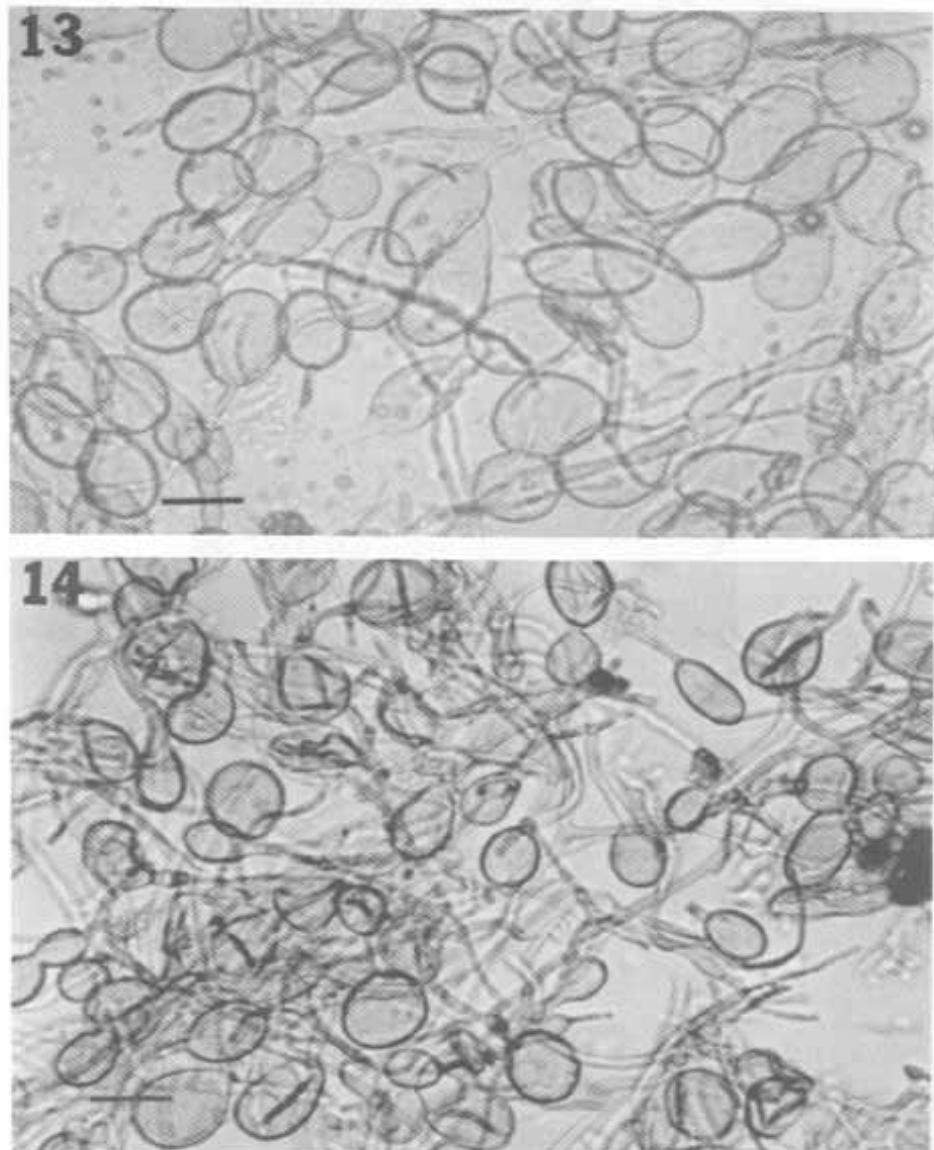
Material examined: Dominican Republic: Cordillera Central, La Vega Prov., above Manabao, Jose Cruz's farm, 19° 4' 46" lat., 70° 48' 11" long., 14 Jan 1997, H. Miller & D.J. Lodge, OKM 26806 (VTMH 3920; JBSD). Santiago Prov., 24 Nov. 1999, Parque Bermúdez, Anton Sape Bueno entrance, 19° 12' 7.4" lat., 70° 59' 0" long., 950 m elev., J.G. Torrez & T.J. Baroni, OKM 27695; La Celestina, Community Forest, 25 Nov. 1999, O.K. & H. Miller, OKM 27706 (HOLOTYPE) (CFMR-1411; JBSD); T.J. Baroni 35, TJB- 8998 (JBSD94018; NY); D.J. Lodge, O.K. & H. Miller, OKM 27710 (CFMR-1413; JBSD).

Observations: All developmental stages have been studied and the distinctive duplex universal veil composed of a thin white outer veil with pyramidal warts together with a powdery cinnamon to rusty brown inner veil (Figs. 17 & 18), and the inamyloid spores are a unique combination of characteristics not seen in any other *Amanita*. In addition, each wart is centered in a shallow depression (Fig. 18) creating a scalloped pattern over the surface of the buttons. Remains of the powdery universal veil are often present on the surface of the lower part of the stipe (Fig. 17 on left), and form a thick layer on the lower side of the partial veil. The range of spore dimensions is very narrow (7–9.5 x 6–8 μm ; $E_m = 1.23$; $E = 1.0$ –1.5). This species was first discovered on the Jose Cruz plantation as a single basidiome in 1997 (OKM 26806), and is named in his honor. The non amyloid spores place it in the subgenus *Amanita*, where no

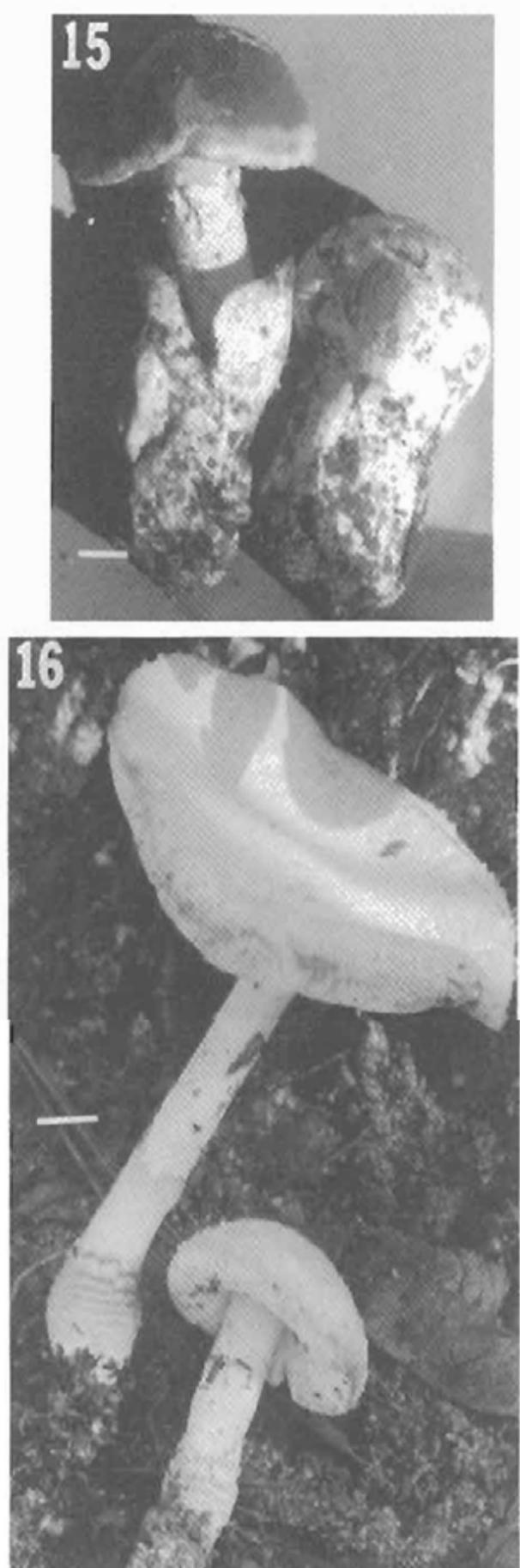
comparable taxon has been described. In addition, the stipe and general stature of our taxon is more robust than other somewhat similar species in subgenus *Amanita*. The cheilocystidia (Fig. 6) are located in a narrow band on the lamellar edge, and are directly attached to hyphae of the trama. The powdery inner universal veil remnants on the pileipellis are the spherical to inflated cells identical to the ones illustrated in Fig. 14. *Amanita rufoferrunginea* Hongo also has a powdery reddish brown universal veil, but it differs from *A. cruzii* in having smaller spores (5.5-9 x 5-7.5 vs. 7-9.5 x 6-8 μm), absence of white pyramidal warts, and the universal veil is composed of larger filamentous hyphae and smaller ovoid to swollen cells (11-18 vs. 10-26 μm wide). Another somewhat similar taxon, *A. aureofloccosa* Bas, differs from *A. cruzii* in having orange squamules on the pileus, and strongly amyloid spores that are globose and 6.5-9.5 μm diameter (Pegler, 1977) rather than inamyloid, subglobose to broadly ellipsoid, and 7-9x 6-7.5 μm . None of the species of *Amanita* described by Pegler (1983) in his flora of the Lesser Antilles nor in other literature we have examined matches this new taxon.



Figures 10-12. Fig. 10 *Amanita occidentalis*. Interwoven filamentous hyphae from universal veil, Figs. 11-12. *Amanita circinata*, Fig. 11. parital veil tissue with swollen cells and filamentous hyphae. Fig. 12. Universal veil largely composed of ovoid to swollen cells, Bar = 10 μm



Figures 13-14. *Amanita cruzii*. Fig. 13. White pyramidal warts of the universal veil composed largely of ovoid to globose cells and filamentous hyphae. Bar = 10 μ m.



Figures 15-16 *Amaita occidentalis*. Button on right with thick universal veil. Bar = 1 cm Fig. 16. *Amanita Circinata*. Note the pyrimidal warts on the lower pilcul. Bar = 1 cm.



Figures 17-18, *Amanita cruzii*. Fig. 17. Specimen on the left exhibits early maturity with much of the outer universal veil sloughed off leaving the powdery inner veil. Specimen on the right is nearly mature with remnants of the inner universal veil remaining but the superior partial veil still in place. Bar. = 1 cm. Fig. 18. A young specimen showing the scalloped surface and distinctive white pyramidal warts with the thin white film in between which makes up the outer universal veil and the powdery inner universal veil over the margin. Bar = 1 cm.

ACKNOWLEDGMENTS

The field work was funded under the US National Science Foundation's Biotic Surveys & Inventories Program, grant DEB-9525902 to the State University of New York, College at Cortland, and a joint venture agreement with the USDA-Forest Service, Forest Products Lab. We thank our cooperators in the Dominican Republic, especially Sr. A. Ferrer of the Fundación Moscoso Puello; Sra. C. Cassanova, G. Dobler, J.G. Torres, and the staff of Fundación Plan Sierra; Ing. M. Mejía and Sra. D. Rodríguez of the Jardín Botánico Dr. Raphael M. Moscoso of the Parques Nacionál. We wish to thank Dr. T.J. Baroni, J.G. Tortes for collections and S.A. Cantrell for logistical support. Hope Miller read the manuscript and assisted in field work.

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