

Hygrophoraceae of the Greater Antilles: *Hygrocybe* subgenus *Hygrocybe*

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Received 11 December 1998; accepted 20 October 1999.

A key to six taxa of *Hygrocybe*, subgenus *Hygrocybe*, sections *Chlorophanae* and *Hygrocybe* is provided. One species is new and four species are reported for the first time from the Greater Antilles. The new species is *H. chimaeroderma* (section *Chlorophanae*). *Hygrocybe acutoconica*, *H. calyptriformis* and *H. incolor* (section *Hygrocybe*) are reported for the first time, and two new varieties, *H. konradii* var. *antillana* and *H. calyptriformis* var. *domingensis* (section *Hygrocybe*) are described. Three new combinations are made: *H. acutoconica* var. *microspora*, *H. conica* var. *brevispora* and *H. luteistipes* (section *Hygrocybe*).

INTRODUCTION

In their paper on the *Hygrophoraceae* of the Luquillo Mountains of Puerto Rico, Lodge & Pegler (1990) only reported two species in subgenus *Hygrocybe*, both in section *Hygrocybe*. These were *H. nigrescens* var. *brevispora* and *H. atosquamosa*. Recent collecting in Puerto Rico and the Dominican Republic for a USDA Forest Service supported and USA National Science Foundation funded survey of basidiomycetes in the Greater Antilles has established the presence of five other taxa in *Hygrocybe* subgenus *Hygrocybe*.

MATERIALS AND METHODS

The study areas in Puerto Rico include lower montane wet forest where *Cyrilla racemiflora* is a characteristic canopy tree, subtropical wet forest where the co-dominant tree species are *Dacryodes excelsa*, *Sloanea berteriana* and *Manilkara bidentata*, serpentine forest where the dominant tree species are *Clusia rosea* Jack. and *Bursera simaruba*, and coastal sand dunes where the dominant tree is *Coccoloba uvifera*. The elevation range was from sea level to 1000 m. In the Dominican Republic, the areas sampled included lower montane wet forest composed of broad leaved trees (elevation 500–1000 m) and pine forest

(elevation from 1000–2000 m) composed of the endemic pine, *Pinus occidentalis*.

Collection information often includes different kinds of numbers assigned to the same specimens. Numbers with the prefix CFMR-PR and CFMR-DR refer to the unique database number at the Center for Forest Mycology Research in Puerto Rico for the basidiomycetes of the Greater Antilles project. Collector or ledger numbers are also provided, if assigned. All recent collections have been deposited in recognized herbaria (CFMR, CORT, JBSD, NY, UPRRP, ZT).

Microstructures were studied using hand-cut sections mounted in aqueous 3% KOH or Melzer's reagent after rehydration in 70% alcohol. Capitalised colour names are from Ridgway as reproduced by Smithe (1975). Munsell colour code notations have been added in brackets. The spore dimensions are based upon 10–20 spores and spore lengths include the hilar appendage. We generally used Boertmann's (1995) concepts of subgenera and sections within subgenus *Hygrocybe*.

TAXONOMY

Hygrocybe (Fr.:Fr.) P. Kumm.

Subgen. *Hygrocybe* sect. *Chlorophanae* (Herink) Arnolds

Hygrocybe chimaeroderma S. A. Cantrell & Lodge, sp. nov. (Figs 1–3)

Etymol.: Chimaero – combination; derma – skin. Having a mixture of an ixotrichoderm and ixocutis in the pileellis.

Pileus 4–6 mm diametro, juventute conicus usque aetate late parabolico-umbonatus; superficie papaverina usque scarlatina,

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† The Forest Products Laboratory in Madison, WI, is maintained in cooperation with the University of Wisconsin and the one 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 is, therefore, in the public domain and not subject to copyright. This published typographical arrangement, however, is © British Mycological Society.

glutinosa, laevi; margine albo, parum translucienti-striato. *Lamellae* adnexae, albae. 1 mm latae, subdistantes (2 mm^{-1}), lamellulis aequilongis: margine plano concoloro. *Stipes* centralis, 15–25 $\times$ 1–2 mm, aequalis parum, clavatus: superficie apice scarlatina, usque carneo-ochracea usque aurantiaco-lutea, basi straminea, glutinosa, laevi. *Spores* 8.3–10.4 $\times$ 5.4–7.4 μm , $Q = 1.1$ –1.7 (media 1.4), ovoideae vel subglobosae, hyalinae, laeves, parietibus tenuibus. *Basidia* 25.5–40 $\times$ 8.8–9.6 μm , clavata, quattuor-spore, fibula basali. *Margo lamellaris* fertilis. *Pleurocystidia* et *cheilocystidia* nulla. *Trama hymenophoralis* regularis, ex hyphis tenuibus composita, 80–360 $\times$ 6–16 μm , fibulata. *Pileipellis* ex ixotrichodermio et ixocute mixtis composita, 100 μm crassa, hyphis 2–3 μm diametro, fibulatis, sectionibus hypharum verticaliter dispositarum (ixotrichodermio) alternantibus. *Stipitipellis* ixocutis, hyphis ixocutis 4–5.6 μm diametro, aliquibus elementis trichodermalibus 1–2 μm diametro, fibulis parvis est.

Holotypus: **Puerto Rico**: Mun Naguabo, Río Prieto Dam, Caribbean National Forest, 19 Jun. 1997 (CFMR-PR4563).

Pileus 4–6 mm diam, conical when young becoming broadly parabolic and umbonate with age: surface Poppy Red (5.9 R 3.8/14.3) or Scarlet (8.9 R 4.54/16.4), glutinous, smooth: margin white, slightly translucent-striate, *Lamellae* adnexed, white, 1 mm broad, subdistant (2 per mm), with lamellulae of one length: edge even, concolorous. *Stipe* central, 15–25 $\times$ 1–2 mm, equal, or slightly clavate; surface Scarlet (8.9 R 4.54/16.4) at the apex, Flesh Ochre (3.0 YR 6.0/8.0) to Orange Yellow (9.9 YR 7.8/13.5), Straw Yellow (5.5 Y 7.9/4.1) at the base, glutinous, smooth. *Spores* 8.3–10.4 $\times$ 5.4–7.4 μm , $Q = 1.1$ –1.7 (mean 1.4), subglobose or ovoid, hyaline, smooth, thin-walled. *Basidia* 25.5–40 $\times$ 8.8–9.6 μm , clavate, four-spored, with basal clamp-connection. *Lamella-edge* fertile. *Pleurocystidia* and *cheilocystidia* none. *Hymenophoral trama* regular, of slender thin-walled hyphae, 80–360 $\times$ 6–16 μm , with clamp-connections. *Pileipellis* a mixture of an ixotrichodermium and an ixocutis, ca 100 μm thick, hyphae of the ixocutis 2–3 μm wide, with clamp-connections, alternating with sections of vertically arranged hyphae (an ixotrichoderm), *Stipitipellis* an ixocutis, with hyphae 4–5.6 μm wide and some

ixotrichodermial elements, 1–2 μm wide, with small clamp-connections.

Specimens examined: **Puerto Rico**: Mun. Naguabo, Río Prieto Dam, Caribbean National Forest, Luquillo Mts, 18° 15' 24" N, 65° 46' 45" W, 450 m, on mossy soil, 19 Jun. 1997, S.A. Cantrell, V. Cuevas, C. Laboy (CFMR-PR 4563 holotype).

Other material examined: **Hygrocybe luteistipes** (Dennis) S.A. Cantrell & Lodge. **comb. nov.** (basionym: *Hygrophorus luteistipes* Dennis. *Kew Bulletin* 8: 264. 1953). **Costa Rica**: Prov. Guanacaste, Volcan Cacao, on mineral soil, 15 Jun. 1995, T. O'Dell & D.J. Lodge, *Lodge CR-465* (F).

This species is unique in subgen. *Hygrocybe* sect. *Chlorophanae* in having a mixture of an ixocutis and an ixotrichodermium in the pileipellis. Macroscopically it resembles *H. luteistipes* and *H. hypohaemacta*, but it differs from the former in having larger spores [8.3–10.4 $\times$ 5.4–7.4 vs 5–8 $\times$ 3–4(–6) μm] and from the latter in having monomorphic spores and basidia. A mixture of ixocutis and ixotrichoderm is also found in subgen. *Pseudohygrocybe*, sect. *Coccineae*, subsect. *Coccineae* (Boertmann 1995). *H. chimaeroderma*, however, has a lamellar trama composed of long slender hyphae up to 360 μm long, with tapered ends, unlike the short tramal hyphae in section *Coccineae*. In subgen. *Pseudohygrocybe* the trama hyphae do not exceed 200 μm , while they are often more than 200 μm long in subgen. *Hygrocybe*, and some have characteristically tapered ends (Boertmann 1995).

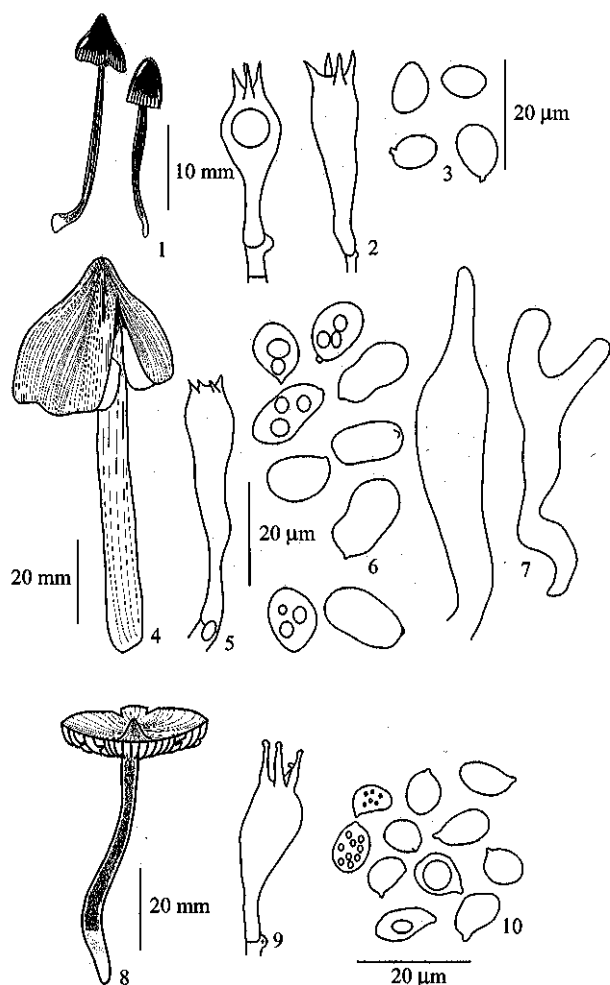
Subgen. *Hygrocybe* sect. *Hygrocybe*

Hygrocybe acutoconica (Clem.) Singer, *Lilloa* 22: 153 (1951). (Figs 4–7)

Pileus 35 mm diam, conical with a small papillate umbo; surface Straw Yellow (5.0 Y 8.0/6.0), innately scaly or fibrillose, splitting radially to near the disc, hygrophanous, dry, shiny. *Lamellae* free or finely adnexed, Cream (3.5 Y

Key to Greater Antillean *Hygrocybe* subgenus *Hygrocybe* including species from Lodge & Pegler (1990)

- 1 Hymenophoral trama regular to subregular, composed of short elements, the longest not exceeding 200 μm , without tapered ends; lamellae variously attached (adnexed, adnate, decurrent) **Subgen. Pseudohygrocybe**
- Hymenophoral trama regular, composed of long thin elements, usually with many exceeding 200 μm , some hyphae with tapered ends; lamellae always adnexed to free **Subgen. Hygrocybe** 2
- 2 (1) Pileus and stipe surface glutinous: smooth, basidiome not blackening **Sect. Cholorophanae**
Only one species from Puerto Rico. Pileus and stipe glutinous. Pileipellis thick a mixture of ixocutis and ixotrichodermium. Spores ovoid or subglobose, max. spore length < 10.5 μm **chimaeroderma**
Pileus and stipe not glutinous: pileus surface dry, moist, lubricous or viscid, smooth or scaly, sometimes blackening **Sect. Hygrocybe** 3
- 3 (2) Basidiomes lavender-pink pileus cuspidate, moist or dry. Spores 8–11.2 $\times$ 5.6–8 μm , broadly ellipsoid, ellipsoid or oblong. A single taxon in the Dominican Republic, differing from the type variety in having a strongly coloured stipe and lacking an ixocutis **calyptriformis** var. **domingensis**
Basidiomes cream, yellow, orange or red in colour, shape variable; surface dry, lubricous or viscid 4
- 4 (3) Pileus and stipe white to cream **incolor**
Pileus and stipe more strongly pigmented 5
- 5 (4) Pileus and stipe bruising black 6
Pileus and stipe not bruising black 7
- 6 (5) Pileus usually < 30 mm diam, not highly fibrillose, smooth or innately scaly, never with a reflexed margin, viscid when moist. Pileipellis an ixocutis. Largest spores up to 10.5 μm long (up to 13 μm in basidiomes with two-spored basidia) **conica** var. **brevispora**
Pileus 30–40 mm diam, with upturned margin, strongly fibrillose, not viscid. Pileipellis a cutis. Largest spores up to 9 μm long **atrosquamosa**
- 7 (5) Spores not or rarely constricted. Maximum spore length 10.5 (–11.2) μm **konradii** var. **antillana**
At least some spores constricted. Maximum spore length 16 μm **acutoconica**



Figs 1–3. *Hygrocybe chimaeroderma*. **Fig. 1.** Basidiomes. **Fig. 2.** Basidia. **Fig. 3.** Spores. **Figs 4–7.** *H. acutoconica* (TJB 7946). **Fig. 4.** Basidiome. **Fig. 5.** Basidium. **Fig. 6.** Spores. **Fig. 7.** Pseudocystidia. **Figs 8–10.** *Hygrocybe calyptriformis* var. *domingensis*. **Fig. 8.** Basidiome. **Fig. 9.** Basidium. **Fig. 10.** Spores.

8.5/4.0). 6 mm broad, close; edge concolourous, eroded-undulate. Stipe central, 80–90 × 5–6 mm, equal, slightly enlarged at the base; surface Straw Yellow (5.0 Y 8.0/6.0), glabrous or innately scaly, shiny. *Spores* 10.4–16 × 6.6–9.6 µm, $Q = 1.3–2$ (mean 1.52), subglobose or ellipsoid, some strangulated, hyaline, smooth, thin-walled, guttulate. *Basidia* 56–67 × 12–12.8 µm, clavate, four-spored, some two-spored. *Lamella-edge* fertile, pseudocystidia mixed with mature basidia. *Pseudocystidia* 67–120 × 8.8–12 µm, ventricose, cylindric, sometimes forked. *Pleurocystidia* and *cheilocystidia* absent. *Hymenophoral trama* regular, 120–374 × 16–27 µm, tapered to 4 µm at the ends. *Pileipellis* a cutis of repent hyphae, laticiferous hyphae present.

Specimens examined: **Puerto Rico:** Mun. Maricao, Monte del Estado Recreational Area. Maricao Commonwealth Forest, Cordillera Central, 18° 9' 13" N, 66° 59' 34" W, 810 m, on serpentine soil, 25 Jun. 1996, D. J. Lodge (CFMR-PR 3614) (T.J. Baroni 7946) (NY, UPRRP); Mun. Loiza. Piñones, 18° 25' 30" N, 65° 57' 42" W, 2 m, on sand dunes with grass near *Coccoloba uvifera*, 19 Nov. 1996, D. J. Lodge (CFMR-PR 3998); *ibid*, 14 Jan. 1998, D. J. Lodge & O. & H. Miller (CFMR-PR 4864) (Lodge-1) (K). **Bermuda:** E. A. McCallan (as *Hydrocybe earlei* Murrill) (NY). **Denmark:** E-Jylland, Århus, Moesgård

Strand, J. Vesterholt, JV 87-430 [as *H. persistens* (Britzelm.) Singer var. *persistens*] (C, CFMR). **Martinique:** Cap St Martin, 500 m, on floor of mesophytic forest, 25 Aug. 1977, J-P. Fiard 851A (as *H. subflavida* Murrill, K(M) 50496). **USA:** Michigan, Cheboygan County, Barry Creek, in hardwoods, 10 Jul. 1967, A. H. Smith 74484 (MICH 36346); Mud lake bog, 12 Jul. 1957, A. H. Smith 57298 & Lowry (MICH 36343); Crawford County, Grayling, 14 Aug. 1963, A. H. Smith 67214 (MICH 36345); Emmet County, Pellston hills, 23 Aug. 1960, A. H. Smith 62992 (MICH 36344); 7-Devils Mts, 7-Devils Station, 4100 ft., 30 Jul. 1954, A. H. Smith 45500 (MICH 33582); Nebraska, Squaw Canon [sic], in sand, 30 Jul 1892, A. F. Woods, *Clements* no. 506 (NEB 164545-holotype); Tennessee, Blount County, Nale's Creek, near Shooks Gap, 30 Oct. 1955, L. R. Hesler 22211 (TENN); Oak Ridge, soil in deciduous woods, 21 Oct. 1960, L. R. Hesler 23742 (TENN).

The collections of *H. acutoconica* cited above generally agreed with the description given by Boertmann (1995) for *H. persistens* var. *persistens*. We agree with Arnolds (1986, 1990) that *H. persistens* and *H. acutoconica* are conspecific. Arnolds (1986) said that the Britzelmayr publication of *H. persistens* was available as early as May 1893 according to Stafleu & Cowan (1976: 35) but he could not locate an exact date for the Clements publication of *Mycena acutoconica* and assumed the former had priority. We have located the distribution date for Clements' publication as 15 April 1893 and Arnolds (pers. comm.) has located a volume with a library stamp of March 1893, so the name *H. acutoconica* has priority over *H. persistens*. Our two collections from the Mun. of Loiza, Puerto Rico (CFMR-PR 3998 & 4864), and some from the Lesser Antilles, differ from our description above in having a Flame Scarlet to Burnt Orange pileus, but this is within the range of colours for this species (Hesler & Smith 1963, Arnolds 1990, Boertmann 1995). Boertmann (1995) described the trama hyphae of *H. persistens* var. *persistens* as having hyphae with tapered ends more than 1000 µm long. In our collections the longest hyphae are around 500 µm in CFMR-PR 3998, which was corroborated by David Boertmann. Candusso (1997) described the hymenophoral trama with hyphae of mainly 160–350 µm long for collections from Europe. In our observations of several collections from the USA and one from Denmark, we found that the length of the trama hyphae were 160–340 µm. In all the descriptions by different authors of four-spored basidiomes the base of the basidia and the hyphae of the hymenophoral trama and the pileipellis are described as having distinctive damp-connections (Hesler & Smith 1963, Arnolds 1990, Boertmann 1995, Candusso 1997). In our observations of various collections, including the type, from the USA the clamp-connections are of the medallion type. Arnolds (1990) and Hesler & Smith (1963) described the pileus as viscid and the pileipellis as an ixocutis of repent and ascending hyphae. In our collections from Puerto Rico, the pileus is dry, never viscid, and the pileipellis is composed of a cutis of repent hyphae, but Boertmann (1995) cites similar collections with a dry pileus from Europe. We follow Boertmann in considering the difference in gelatinisation of the pileipellis as infraspecific variation within *H. acutoconica*. The collections from Bermuda, Denmark and USA have a thick ixocutis which matches the type description. Some spores in our collections are longer (up to 16 µm) and broader (up to 9.6 µm) than is typical for *H. acutoconica* (10–12.5 × 5–

6.5 µm). The spore shape resembles that of *Hygrocybe conica* spores, but our collections differ from *H. conica* in lacking a black staining reaction.

Hygrocybe calyptriformis* var. *domingensis Lodge & S. A. Cantrell, var. nov. (Figs 8–10)
Etym.: from the Dominican Republic.

A typo differt stipes profundus vinaceus, sporis 8–11.2 × 5.6–8 µm, ixocutis nullis.

Typi: Dominican Republic. Prov. La Vega, Valle Nuevo, 21 Nov. 1997, CFMR-DR 537 (ZT-holotypus; CFMR, JBSD-isotypi).

Pileus 35 mm diam, convex-cuspidate; surface Deep Vinaceous (2.5 R 5.5/6.0), margin uplifted, radially fibrillose, moist, hygrophanous. *Lamellae* adnexed to sinuate, pale Vinaceous (2.5 R 5.5/6.0), 4 mm broad, distant, with lamellulae of two lengths, forked toward the margin and stipe. *Stipe* 20–68 × 3–5 mm, tapered at the apex and base, hollow; surface Deep Vinaceous (2.5 R 5.5/6.0), translucent, moist. *Spores* 8–11.2 × 5.6–8 µm, Q = 1.15–1.8 (mean 1.4), broadly ellipsoid, ellipsoid or oblong, hyaline, thin-walled, inamyloid, *Basidia* 32–48 × 8.8–10.4 µm, four-spored, some two-spored, with a medallion clamp-connection at the base. *Pseudocystidium* infrequent to absent, just one measured, 45 × 14 µm, ventricose. *Lamella-edge* fertile. *Hymenophoral trama* regular, hyphae 104–660 × 4.8–22 µm, mostly tapered at the ends. *Pileipellis* a cutis of repent hyphae, with slightly gelatinized walls, not forming a true ixocutis, hyphae 4–6.4 µm wide, thin-walled, unbanded, no clamp-connections present.

Specimens examined: **Dominican Republic**: Prov. La Vega, across from Fundación Moscosa Puello cabin, Valle Nuevo, 18° 46' 28" N, 70° 37' 28" W, 2200 m, on soil, 21 Nov. 1997, *E. Horak*, CFMR-DR 537 (*D.J. Lodge* DR-3) (ZT-holotypus; CFMR, JBSD-isotypi). **England**: W. Sussex, Petworth new cemetery, on soil, 18 Oct. 1998, *Ted Brown*, CFMR-ENG 3 (CFMR, K). **USA**: New York, *T.J. Baroni* 3878 (CORT).

The Antillean collection agrees in many respects with descriptions of *H. calyptriformis* by Boertmann (1995), Hesler & Smith (1963), and Arnolds (1990), but because of the absence of a true ixocutis in the pileus and the strongly coloured and slender stipe (3–5 mm instead of 5–15 mm), a new variety is described. Although reports in the literature for this species indicate smaller spores (6.8–8 × 4.4–5.5 µm; Hesler & Smith 1963; Boertmann 1995) our study of a recent collection from England revealed spore lengths that match our Dominican Republic specimen (8–12 × 4.8–6.4 µm). Inclusion of the hilar appendix in our measurements only contributes ca 1 µm to the spore lengths, and does not account for the larger spores in either the British or Dominican Republic collections. The type collection of *H. calyptriformis* (in K) is sterile according to E. Horak (pers. comm.). The cited collection from England has a distinct ixocutis (120–130 µm thick) and a few pseudocystidia. Hesler & Smith (1963) note that American collections have scattered pseudocystidia, but Boertmann (1995) does not mention pseudocystidia in descriptions of European collections. We only found one pseudocystidium in the Dominican Republic collection, and none were found in our study of a New York collection. Egon Horak (pers. comm.)

studied the Dominican Republic material and found a match with European collections, except for having only slightly gelatinised walls in the pileipellis hyphae rather than a true ixocutis.

Hygrocybe conica* var. *brevispora (Dennis) S. A. Cantrell & Lodge, comb. nov.

Basionym: *Hygrophorus nigrescens* var. *brevisporus* Dennis, *Kew Bull.* 15: 69 (1961).

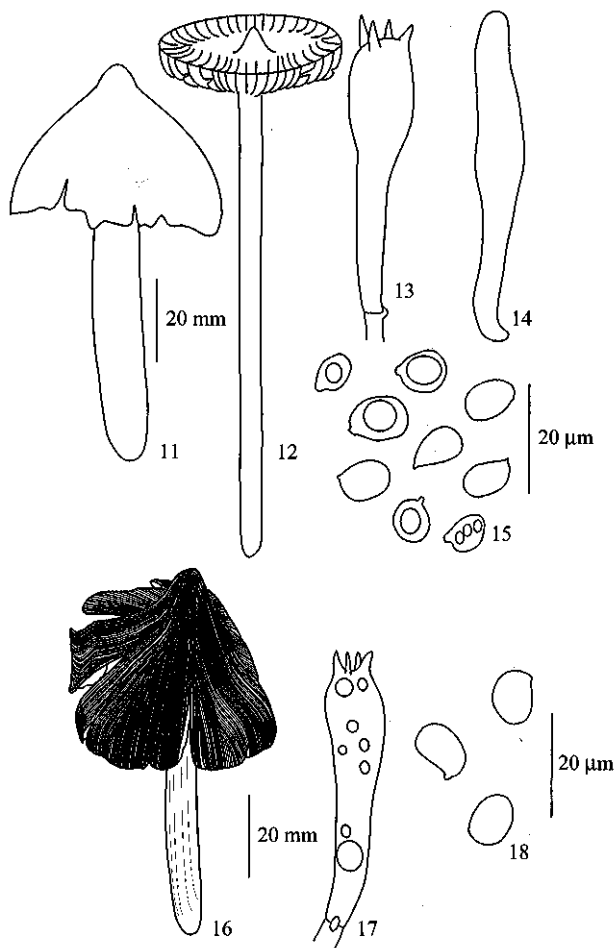
Hygrocybe nigrescens var. *brevispora* (Dennis) Pegler, *Kew Bull., Addit. Ser.* 9: 53 (1983).

Description: See Lodge & Pegler (1990). Pegler (1983).

A new variety of *Hygrophorus nigrescens* (Quél.) Quél. was described from Venezuela by Dennis (*loc. cit.*) as *H. nigrescens* var. *brevisporus* for collections with globose to ovoid spores (7.5–10.5 × 6–8 µm, Q = 0.89–1.4, mean 1.23). We believe that this variety is better placed within *Hygrocybe conica* (Schaeff.: Fr.) P. Kumm. Arnolds (1986: 149) rejected the use of the name *Hygrophorus nigrescens* for collections with small red pilei that bruised black because the original description of *H. nigrescens* referred to a large taxon with pileus 100 mm broad that was white at first and later yellow with rose to orange fibrils. Arnolds (1986) suggested that an alternative name [for large red forms] was *Hygrocybe pseudoconica* J. E. Lange. Elsewhere in the same paper (1986: 152) and later (1990: 83–84), Arnolds stated that *H. pseudoconica* was only a form of *H. conica*. Arnolds (1986, 1990) restricts *H. conica* var. *conica* f. *pseudoconica* to those collections with pileus 40–70 mm, and assigns the smaller form with pileus 15–40 mm to *H. conica* var. *conica* f. *conica*. This view was also advocated by Hesler & Smith (1963). Kühner (1974) also had the same point of view as Arnolds (1986) and synonymised (with a question mark) *H. nigrescens* under *H. conica* var. *pseudoconica*.

We compared collections of *H. conica* var. *conica sensu stricto* to those of *H. conica* var. *brevispora* and found that they differ in spore shape and distribution of the pseudocystidia. *Hygrocybe conica* var. *conica* has not been found in the Antilles, but it is common at high elevation in Costa Rica and has a global distribution (Boertmann 1995). The spores in *H. conica* var. *brevispora* are globose, subglobose or broadly ellipsoid and very rarely ellipsoid (Q = 0.9–1.4) regardless of whether they have two- or four-spored basidia, while at least some spores in var. *conica* are much more elongated (Q up to 2.8). We concur with Boertmann (1995) that subglobose spores in *H. conica* var. *conica* are found in collections with two-spored basidia. The pseudocystidia in *H. conica* var. *brevispora* can be found throughout the hymenium, although they are more concentrated near or on the lamellar edge, while pseudocystidia are either absent or confined to the lamellar edge in *H. conica* var. *conica*. The *Hygrocybe conica*-complex would benefit from a world wide study and molecular analyses.

Specimens examined of *H. conica* var. *brevispora*: **Dominican Republic**: Prov. La Vega, El Mogote de Jarabacoa, 19° 4' 30" N, 70° 40' 7" W, 1500 m, on soil, 11 Mar. 1994, *S. Latta*, CFMR-DR 65 (JBSD); Los Tablones Trail, Parque Armando Bermúdez, Cordillera Central, 19° 3' N, 70° 55' W, 1200 m, on soil, 15 Jan. 1997, *S. A. Cantrell*, *T. J. Baroni* & *O. P. Perdomo*, CFMR-DR 339 (JBSD); Valle Nuevo, across stream from Fundación Moscosa Puello cabin,



Figs 11–15. *Hygrocybe incolor*. **Fig. 11.** Basidiome of collection CFMR PR 2769. **Fig. 12.** Basidiome of collection CFMR PR 4765. **Fig. 13.** Basidium. **Fig. 14.** Pseudocystidium. **Fig. 15.** Spores. **Figs 16–18.** *H. konradii* var. *antillana*. **Fig. 16.** Basidiome. **Fig. 17.** Basidium. **Fig. 18.** Spores.

Cordillera Central, 18° 46' 28" N, 70° 37' 28" W, 2200 m, on soil in pine forest, 21 Nov. 1997, *E. Harak*, CFMR-DR 647, DJL DR-4 (NY); Valle Nuevo near the monument, Rt 41, La Nevera, Cordillera Central, 18° 46' N, 70° 37' W. 2300 m, on soil in pine forest, 21 Nov. 1997, *E. Harak*, CFMR-DR 648, DJL DR-17 (CFMR, JBSD). **Puerto Rico:** Recent collections since Lodge & Pegler (1990): Caribbean National Forest, Luquillo Mts, Mun. Luquillo, 200–300 m, on soil, 1 Oct. 1996, CFMR-PR 3464 (CFMR); 8 Oct. 1996, CFMR-PR 3492 (CFMR); 9 Dec. 1996, CFMR-PR 3743 (NY); 10 Dec. 1996, CFMR-PR 3752 (NY); Mun Rio Grande, 360–645 m, on soil or very rotten wood, 8 Jan. 1993, CFMR-PR 1057 (K); 20 Nov. 1996, CFMR-PR 4023 (UPRRP); 11 Aug. 1997, CFMR-PR 4891 (UPRRP); 16 Jun. 1997, CFMR-PR 5218 (K); Mun. Adjuntas, Guilarte Commonwealth Forest off Rd 131, Cordillera Central, 18° 8' 59" N, 66° 45' 46" W, 900 m, on humus, 21 Jan. 1998, S.A. Cantrell 9820, CFMR-PR 5412 (UPRRP).

Specimens examined of *H. conica* var. *conica*: Canary Islands: La Orotava, 1985, *C.L. Champion*, FT 213 (K). **Costa Rica:** Cuericí, Talamanca Ridge, 3000–3500 m, 13 Sep. 1969, *L. D. Gómez P.* 3196 (K); Prov. de Heredia, Bosque de la Hoya, 26 Aug. 1969, *L. D. Gómez P.* 3173 (K); Prov. de Cartago, Sa Gerardo, 3 Aug. 1981, *R. Singer* B12647, F1051815 (F); *ibid*, near Cerro de la Muerte, on soil in pasture under oak and chusquea. 31 Jul. 1986, *D.J. Lodge* CR 366 (CFMR). **Malawi:** Zomba District, *J. Williamson* 761 (K); Université Abidjan, *L. Aké Assi* 481 (K). **Norway:** Høgsnyta

Mtn, 1975, *Pegler* 2638 (K). **Portugal:** Lisbon, 29 Oct. 1955, *Dennis* 1658 (K). **Sweden:** Borgsjö, 5 Sep. 1991, *D.J. Lodge*, CFMR-SWE 1 (CFMR). **USA:** Massachusetts, Hampshire County, Amherst, Wildwood Cemetery, 9 Aug. 1975, *T.J. Baroni* 2089 (CORTI); Michigan, Pelaton Hills, 1961, *D.A. Reid* (K); New York, Cortland County, Cortland SUCC Campus, behind Bowers' Hall in parking lot, in grassy area, 15 Sep. 1997, *T.J. Baroni* 8562 (CORT); Hoxie Gorge, on humus, 19 Aug. 1989, *T.J. & L. Baroni*, *T.J. Baroni* 6290 (CORT); Warren County, The Glen, SUNY Albany, on soil, 19 Jul. 1986, *E. Both*, *T.J. Baroni* 5133, (CORT); Tennessee, Mt Le Conte, Great Smokey Mountain National Park, 25 Aug. 1940, *L. R. Hesler* 12834 (TENN); *ibid*, 900 m, on soil, 6 Aug. 1939, *L. R. Hesler* 12239 (TENN).

Hygrocybe incolor Pegler, *Kew Bull., Addit. Ser.* 9: 56 (1983). (Figs 11–15)

Pileus 35–45 mm diam, broadly convex to plane, umbonate or cuspidate, margin undulating, incised and eroded; surface white with Buff-Yellow (2.5 Y 8.0/6.0) centre, translucent-striate and slightly sulcate-striate, moist, lubricous. *Lamellae* sinuate, white, up to 13 mm broad, forked near the margin, distant, with lamellulae of one length; edge eroded, concolorous. *Stipe* 75–110 × 6–10 mm, equal, white, fibrillose, moist, shiny. *Spores* 8.3–13 × 5.6–8.0 µm, *Q* = 1.28–2.16 (mean 1.4), subglobose or ellipsoid, rarely oblong, hyaline, smooth, thin-walled, inamyloid. *Basidia* 32–47 × 8–12 µm, clavate, four-spored, with basal clamp-connection, *Lamella-edge* fertile, pseudocystidia mixed with mature basidia. *Pseudocystidia* 50.5–60 × 6.4–10.4 µm, cylindric or slightly clavate. *Pleurocystidia* and *cheilocystidia* none. *Hymenopharal trama* regular, hyphae 116–380 × 12–16 µm, with tapered ends. *Pileipellis* a cutis of repent hyphae, hyphae 10–30 µm wide, laticiferous hyphae present.

Specimens examined: **Puerto Rico:** Mu. Rio Grande, Caribbean National Forest, Luquillo Mts, El Verde Research area, near fork in trail to Radiation Center, 18° 19' 24" N, 65° 49' 20" W, 360 m, 22 Sep. 1994, *G. González* and *S. Matta*, CFMR-PR 2769 (CFMR); *ibid*, Quebrada Grande, 550 m, 13 Apr. 1998, *S.A. Cantrell* and *C. Laboy*, CFMR-PR 4765 (*S.A. Cantrell* PR 9842) (UPRRP, NY).

Our collections agreed with those described in Pegler (1983). This species was originally described from Martinique in the Lesser Antilles and has not been reported elsewhere. Other white or pale species of *Hygrocybe* have been compared by Boertmann (1998).

Hygrocybe konradii* var. *antillana Lodge & S. A. Cantrell, var. nov. (Figs 16–18)

A typo differt sporis angustii (5.6–7.2) µm.

Holotypus: **Puerto Rico:** Mun. Rio Grande, Caimitillo Trail, Caribbean National Forest, 16 Jun 1997 (CFMR-PR 4555).

Pileus 28–51 mm diam, conical to broadly parabolic-umbonate when young, expanding to broadly convex-umbonate or cuspidate in age; surface Flame Scarlet (10.0 R 5.0/16.0) or Chrome Orange (2.5 YR 6.0/16.0), radially fibrillose-silky, sulcate-striate, moist, hygrophanous. *Lamellae* free or adnexed, Pale Horn (2.2 Y 8.1/3.4), 2–4 mm broad, subdistant (2 mm⁻¹ at margin, more than 1 mm apart half way to the margin), with

lamellulae of one to three lengths; edge even, concolourous. *Stipe* 7–40 × 2–8 mm, equal or tapered at apex; surface Spectrum Yellow (6.0 Y 8.5/12.0) to Chrome Orange (2.5 YR 6.0/16.0) with some Flame Scarlet (10.0 R 5.0/16.0), fibrillose, moist. *Spores* 8.8–11.2 × 5.6–7.2 µm, Q = 1.33–2 (mean 1.7), oblong or ellipsoid, not or very rarely strangulated, hyaline, thin-walled, inamyloid. *Basidia* 40–59 × 9.1–11.2 µm, clavate, four-spored, with basal clamp-connection. *Lamella-edge* fertile. *Pleurocystidia* and *cheilocystidia* none. *Hymenophoral trama* regular, hyphae 75–400 µm long, composed of a mixture of slender hyphae, 4–6 µm wide, with clamp-connections and broad hyphae, 9.6–12 µm wide with tapered ends. *Pileipellis* a cutis of repent hyphae, not gelatinized or with a very thin ixocutis, sometimes reduced to patches.

Specimens examined: **Antigua**: Cades Bay, 6 Nov. 1920, E. M. Wakefield 17 (as *H. subflavida*) (K(M) 50495). **Martinique**: La Caravelle, 14 Nov. 1976, J.-P. Fiard 831A (K(M) 50490); *ibid*, 1 Dec. 1976, J.-P. Fiard 8318 (K(M) 50469), St Joseph, Forêt du Morne des Olives, 350 m, in mixed primary hygrophytic forest and mahogany plantation, Nov. 1976, J.-P. Fiard 367A (as *H. acutoconira*) (K(M) 50494). Morne Montaubin, Fonds St Denis, 450 m, solitary on floor in degraded mesophytic forest. 25 Sept. 1977, Pegler 2862 (as *H. acutoconica*) (K(M) 50493). **Puerto Rico**: Mun. Rio Grande, Caribbean National Forest, Luquillo Mts, Caimitillo Trail, 18° 18' 17"N, 65° 47' 11" W, 730 m, on clay soil, 16 Jun. 1997, D. J. Lodge (CFMR-PR 4555-holotype); *ibid*, near El Yunque Trail, 18° 18' 25"N, 65° 47' 35" W, 880 m, on soil, 11 Jun. 1997, L. Baroni, CFMR-PR 4543(NY); *ibid*, Mun. Naguabo, Tradewinds Trail, 18° 17' 43"N, 65° 47' 33" W, 800 m, on soil, 15 Jul. 1997, S. A. Cantrell, D. Llorens, M. Serrano, CFMR-PR4597 (S.A. Cantrell PR9759) (UPRRP).

Other material examined: *Hygrocybe konradii*. **Denmark**: E. Jylland, Vorskø, 24 Sep. 1981, T. Laessøe, TL-Vorskø-677 (C, CFMR).

This taxon was previously reported by Pegler (1983) from Martinique in the Lesser Antilles, but ours is the first report for the Greater Antilles. *Hygrocybe konradii* was originally described from Switzerland. Boertmann (1995) reduced it to a variety of *H. persistens* (Britzelm.) Singer based on the few, intergrading differences in spore characteristics, but we have decided to follow Arnolds (1990) and treat it as a separate species. Antillean collections differ in lacking a viscid pileus, but some of the collections were moist and had a thin ixocutis or patches of thin, gelatinized hyphae (CFMR-PR 4597, 4555, 4543 and K(M) 50495). Some European collections of *H. konradii* that have a dry surface even in young fresh specimens have been observed by Boertmann (as *H. persistens* var. *konradii*, 1995). In our collections, Wakefield 17 from Antigua and those cited by Pegler (1983) for Martinique, the spores are consistently narrower than those of *H. konradii* from Europe (5.5–7.5 µm vs 6–10.5 µm) and based on this a new variety is erected. The related *H. acutoconica* has constricted, ovoid-oblong or cylindrical spores whereas *H. konradii* has spores that are non-constricted or rarely constricted and are broadly ellipsoid or ellipsoid. *Hygrocybe acutoconica* var. *microspora** was described from a single collection from Tennessee, USA (Hesler & Smith 1963). This taxon differs from our collections by having a viscid pileus and smaller spores.

****Hygrocybe acutoconica* var. *microspora*** (Hesler & A. H. Sm.) S. A. Cantrell & Lodge, **comb. nov.** Basionym: *Hygrophorus acutoconitus* var. *microsporus* Hesler & A. H. Sm., *N. Am. Sp. Hygrophorus*: 139 (1963).

The collection from Antigua was previously identified as *Hygrocybe earlei* (Murr.) Murr., and was latter assigned by Pegler (1983) to *H. subflavida* (Murr.) Pegler. Our study of the type collection of *H. subflavida* from Morce's Gap, Jamaica (Murrill 674, NY) has revealed that this taxon does not belong to subgen. *Hygrocybe* because the trama hyphae are mostly 30–60 µm long, rarely reaching 150 µm and never with tapered ends. Also, the lamellae are adnate with a decurrent tooth instead of adnexed to almost free, which is a characteristic of species in subgen. *Hygrocybe*. Based on these observations, we believe that *H. subflavida* belongs to subgen. *Pseudohygrocybe* sect. *Coccineae*. Although our collections of *H. konradii* in the Caribbean have shorter trama hyphae (up to 400 µm long) than collections cited by Boertmann (1995), they are within the range of collections from Europe cited by Candusso (1997) and a collection from Denmark that we examined.

ACKNOWLEDGEMENTS

The first author was supported by funds from the USDA Forest Service, Washington office and the Forest Products Laboratory for a Postdoctoral fellowship, administered through the National Research Council with additional funding from the National Science Foundation, Biotic Surveys and Inventories Program, grant DEB-95-25902, to the Research Foundation of the State University of New York at Cortland. The NSF grant also supported collecting. We thank the USDA Forest Service, International Institute of Tropical Forestry for providing facilities, and the Puerto Rican Department of Natural Resources and the National Parks Office in the Dominican Republic for collecting permits. We extend our gratitude to Dr D. Kolteman at UPR-Mayaguer for the Latin description, L. A. Barley for computer, herbarium and logistical support and Dr T. I. Baroni for loans of herbarium specimens and photographs. We are also grateful for collections from C. Laboy, V. Cuevas, M. Serrano, D. Llorens, R. Bonilla, B. Ortiz Santana A. Nieves-Rivera, L. Baroni, G. Gonzalez, S. Matta O. P. Perdomo, H. Miller and Profs O. K. Miller and E. Horak. Our work in the Dominican Republic would not have been possible without lodging and logistical support from Mr Andrés Ferrer and the Fundación Moscoso Puella, and the cooperation of Lic. M. Mejías and D. Castillo at the National Botanical Garden. We especially thank Drs T. J. Baroni, D. Boertmann R. Courtecuisse, E. Horak, D. Pegler, and an unknown reviewer for their valuable comments on this manuscript, the curators of the herbaria at Cartland, Kew, the New York Botanical Gardens, and T. Laessøe at Copenhagen for help with specimens.

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Corresponding Editor: T. Laessøe