A rare and unusual lignicolous species of *Inocybe* (Agaricales) from eastern North America

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Abstract. *Inocybe tubarioides* is a rarely collected or recognized agaric with an unusual combination of ecological and morphological characters for this genus, namely a lignicolous habit and a strongly hygrophanous pileus. The species is known only from eastern North America and is reported here for the first time from states in New England and Canada. A taxonomic description is provided, including the first photographic record of the species and discussion of its evolutionary history. Based on molecular phylogenetic analysis the species is most closely related with significant measures of statistical support to two other narrowly endemic species of *Inocybe*: one also from eastern North America (*I. tahquamenonensis*) and another from northern Europe (*I. relicina*), the latter of which is the type of the genus *Inocybe*. These three species constitute the clade that corresponds with section *Inocybe*.

Résumé. *Inocybe tubarioides* est un Agaric rarement signalé, présentant une combinaison inhabituelle de caractéristiques écologiques et morphologiques, en particulier l'habitat lignicole et le chapeau fortement hygrophane. Cette espèce n'est connue que de la façade orientale de l'Amérique du Nord, et est signalée ici pour la première fois en Nouvelle-Angleterre et Canada. Une description est fournie, accompagnée pour la première fois d'une photographie, et d'une discussion quant à son histoire évolutive. D'après des analyses moléculaires phylogénétiques soutenues par des mesures statistiques significatives, cette espèce est très étroitement apparentée à deux autres espèces endémiques, l'une également connue de l'Est de l'Amérique du Nord (*I. tahquamenonensis*), l'autre d'Europe du Nord (*I. relicina*) qui se trouve être le type du genre *Inocybe*. Ces trois espèces constituent la clade: section *Inocybe*.

Key Words: Ectomycorrhiza, Inocybaceae, morphology, systematics, taxonomy.

Inocybe tubarioides G. F. Atk. is a rarely encountered or recognized agaric known from only a small number of collections in eastern North America since it was first described by G. F. Atkinson at Cornell University almost 90 years ago (Atkinson, 1918; Stuntz, 1954; Smith et al., 1979). The fungus displays an unusual array of morphological and ecological characters at odds with features of most species in the family Inocybaceae Jülich (Matheny, 2005). Species of Inocybaceae, with rare exceptions, produce fruiting bodies directly on soil, whereas *I. tubarioides* is consistently observed fruiting on rotten wood. Gross morphological features of *I. tubarioides*, which include a strongly hygrophanous pileus, uncinate to subdecurrent lamellae, and lack of distinctive odor plus a lignicolous habit, could point to a generic affiliation with either *Tubaria* (W. G. Sm.) Gillet or *Simocybe* P.

Karst., two stipitate, dull brown-spored, and primarily wood-inhabiting genera of Agaricales. However, the presence of nodulose basidiospores and metuloid hymenial cystidia suggest an anatomical alliance with the genus *Inocybe* (Fr.) Fr. (Smith & Hesler, 1938).

Here we present a taxonomic description of *I. tubarioides* from several recent collections made between 1993 and 2007, the first recorded since 1957, including the first published photographic record of the species. We also synthesize data drawn from historical records based on vouchered specimens from major North American fungal herbaria. Molecular data and phylogenetic analyses are employed that confirm the placement of *I. tubarioides* in the "Inocybe clade" (Matheny, 2005; Matheny & Bougher, 2006), a synapomorphy of which is the presence of pleurocystidia often of the metuloid-type. *Inocybe tubarioides* is most closely allied to *I. relicina*, an endemic species of Fennoscandia and type of the genus *Inocybe*, and *I. tahquamenonensis*, an endemic species of deciduous forests in eastern North America. These three species constitute a monophyletic group, which we refer to as section *Inocybe*.

Materials and methods

Field collections.— Five collections of *I. tubarioides* were made between years 1993–2007 in North Carolina, Massachusetts, New Hampshire, Quebec, and Tennessee. Macroscopic features were noted when fresh, or the materials were photographed and then later identified by the lead author. Colors of fresh fruit bodies were documented with the Munsell Soil Color Chart (1954). Macrochemical reactions of fresh material to PDAB (p-dimethylamino-benzaldehyde) and tincture of guaiac were noted on *PBM 2570* (TENN). These macrochemical reactions can be of taxonomic utility in various groups of Agaricales (Lennox, 1979). Specimens were then air-dried on a food dehydrator. Spore, cystidial, and hyphal dimensions were recorded from dried material using light microscopy after sections were rehydrated in 2–5% KOH. Fragments of type materials were reconstituted for 18 hrs in 5% KOH. Cell dimensions are provided in ranges with outliers placed in parentheses. The number of total spores and the number of collections from which they were measured are indicated in parentheses including a backslash (X/Y). Materials examined are curated at the following herbaria: CUP, F, LIP, MICH, NY, TENN, and WTU. No indigenous Canadian collections of *I. tubarioides* were found at ACAD, DAOM and TRTC (Scott Redhead, pers. comm.; David Malloch, pers. comm.). Herbarium abbreviations follow Holmgren and Holmgren (1988). Material from Quebec is housed at "CMMTL", Cercle des Mycologues de Montréal.

DNA extraction, PCR, sequencing, and phylogenetic analysis.— DNA of *I. tubarioides* from North Carolina and New Hampshire was extracted, PCR performed, and between one and three gene regions sequenced (*rpb1*, *rpb2*, nLSU-rRNA) following protocols outlined in Matheny (2005). Sequencing was done on an ABI Prism 3100 DNA Sequencer.

Sequence alignment, dataset editing, and phylogenetic analyses were performed using MacClade (Maddison & Maddison, 2000), PAUP* (Swofford, 2003), MrBayes 3.1.2 (Ronquist & Huelsenbeck, 2003), and GARLI v0.951 (Zwickl, 2006) on a dataset of 60 taxa and 3434 characters available online at http://www.treebase.org/treebase/index.html, or by request from the lead author (S2190, M4150). Preliminary BLAST searches of *rpb1*, *rpb2*, and nLSU-rRNA gene sequences of *I. tubarioides* at the NCBI database indicated a close affiliation with the "Inocybe clade" of Matheny (2005). Thus, the 84-taxon dataset of Matheny (2005) was pruned to taxa of the "Inocybe clade" using *I. calamistrata* and *I. rimosa* for rooting purposes. Newly published sequences (EU 307819–23, EU307828–33, EU307835–36, EU307843–47, AY732209, EF561633, EU307857–58, EU307814–16, and EU43 3887–89; Kropp et al., unpublished) of the following species were also included in the dataset with collection numbers and herbaria in parentheses: *I. albodisca* Peck (PBM 1390, WTU), *I. fraudans* (JFA11831, WTU), *I. fuligineoatra* Huijsman (PBM 2662, TENN), *I. hirtella* Bres. (PBM 2650, TENN), *I. intricata* Peck (PBM 2600, TENN), *I. paludinella* (Peck) Sacc. (PBM 2552, TENN), *I. rimosa* (Bull.: Fr.) P. Kumm. (PBM 2574, TENN), *I. subexilis* Peck (PBM 2620, TENN), *I. luteifolia* A. H. Sm.

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(PBM 2642, TENN), and *I. griseolilacina* J. E. Lange (PBM 2661, TENN). *Inocybe* "*praecox*" is a provisional name applied to what had been referred to as *I. abietis* Kühner in Matheny et al. (2002) and Matheny (2005) (Kropp et al., unpublished). Five sequences of *I. tubarioides* have been deposited at NCBI (AY732210, AY732211, EU307854, EU307855, EU307856).

Bayesian analysis was performed after partitioning the dataset into eight partitions: nLSU-rRNA; *rpb1*-intron2 and intron3; and first, second, and third codon positions of coding regions of *rpb1* and *rpb2*. Two independent MCMC analyses were run for five million generations saving trees every 500 generations under a GTR model of evolution plus rate-heterogeneity parameters—a proportion of invariant sites (I), and a gamma-distributed rate parameter (Γ)—for each partition. Trees sampled from the MCMC posterior distribution were assessed by a convergence diagnostic (average standard deviation of split frequencies <0.01). Trees that passed this diagnostic from the independent runs were pooled together and used to generate a 50% majority-rule consensus tree with branch lengths. Nodes that were recovered more than 95% of the time were considered to have a significant posterior probability (PP).

One hundred non-parametric bootstrap replicates were also performed under the Maximum Likelihood (ML) criterion using GARLI. Default parameters were used except that bootstrap replicates were limited to 5000 generations per replicate. Multiple bootstrap analyses were done to affirm consistency of results. A GTR model of substitution was used allowing GARLI to estimate base frequencies and rate heterogeneity parameters. A bootstrap proportion greater than 70% was considered significant.

Taxonomy

Inocybe tubarioides G. F. Atk., Am. J. Bot. 5: 217. 1918. Type: United States. New York, near Ithaca, McGowan's Woods, 17 July 1903, leg. *C. H. Kauffman*, *CUP-A-015238* (holotype: CUP; isotype: WTU). (Figs. 1, 2)

Pileus 8–25 mm broad, conico-convex to convex or convex with a flattened center, umbo absent, margin deeply decurved to decurved, not appendiculate; surface dry, woolly-furfuraceous in appearance, under a magnification lens matted tomentose-fibrillose with fibrils often forming small appressed scales, not at all rimose or striate, strongly hygrophanous; color when fresh chestnut brown (10YR 3/3) or dark brown or grayish olivaceous, fading to yellowish brown (10YR 5/6) and eventually brownish yellow (10YR 6/6) or pale brown (10YR 6/3), in faded condition the extreme margin may retain a dark brown color (as in Fig. 1); context not fragile, up to 1.5 mm thick, color dingy pale brown to whitish, unchanging (or somewhat brunnescent in PBM 2550), odor mild or not distinctive, not spermatic, taste mild; flesh imparting no reaction after application of PDAB, no immediate reaction with guaiac. Lamellae moderately close with two to three tiers of lamellulae present, adnate to subdecurrent or uncinate, seceding in age with decurrent tooth, up to 4 mm broad, grayish ochraceous to brown (10YR 5/3) or brown with grayish tint, edges pallid-fimbriate but not distinctly so, edges becoming brown upon drying. Stipe 12–40×2–4 mm at the apex, terete or slightly compressed, slightly swollen or tapered towards the white mycelioid base, base never bulbous, pruinose at the extreme apex only, elsewhere silky-fibrillose to fibrillose, cortina not observed but presumably fugacious due to lack of caulocystidia below the stipe center, excoriate below in age; color light yellowish brown to yellowish brown (10YR 6/4–5/4) or very pale brown (10YR 7/3) mixed with brown streaks (10YR 5/3); context solid or stuffed, whitish.

Spores 6.5–8 (−9) × 4.5–6 µm, av. 7.3× 5.2 µm [85 spores/6 collections], gibbous with mostly 7–9 moderately to small-sized nodules about a polygonal or irregularly triangular outline, often with an apical nodule, occasionally trapeziform in profile, rarely cruciform; yellowish brown to brownish yellow, apiculus small and inconspicuous. Basidia 20–30×7–9.5 µm, 4-sterigmate, clavate to clavate-capitate, hyaline; subhymenium well-developed, 12–15 µm thick, irregularly cellular. Pleurocystidia 38–68×11–18 µm, infrequently observed, mostly utriform with a slender basal pedicel, slightly thick-walled apically, 1–3 µm thick, thin-walled elsewhere, apices incrusted

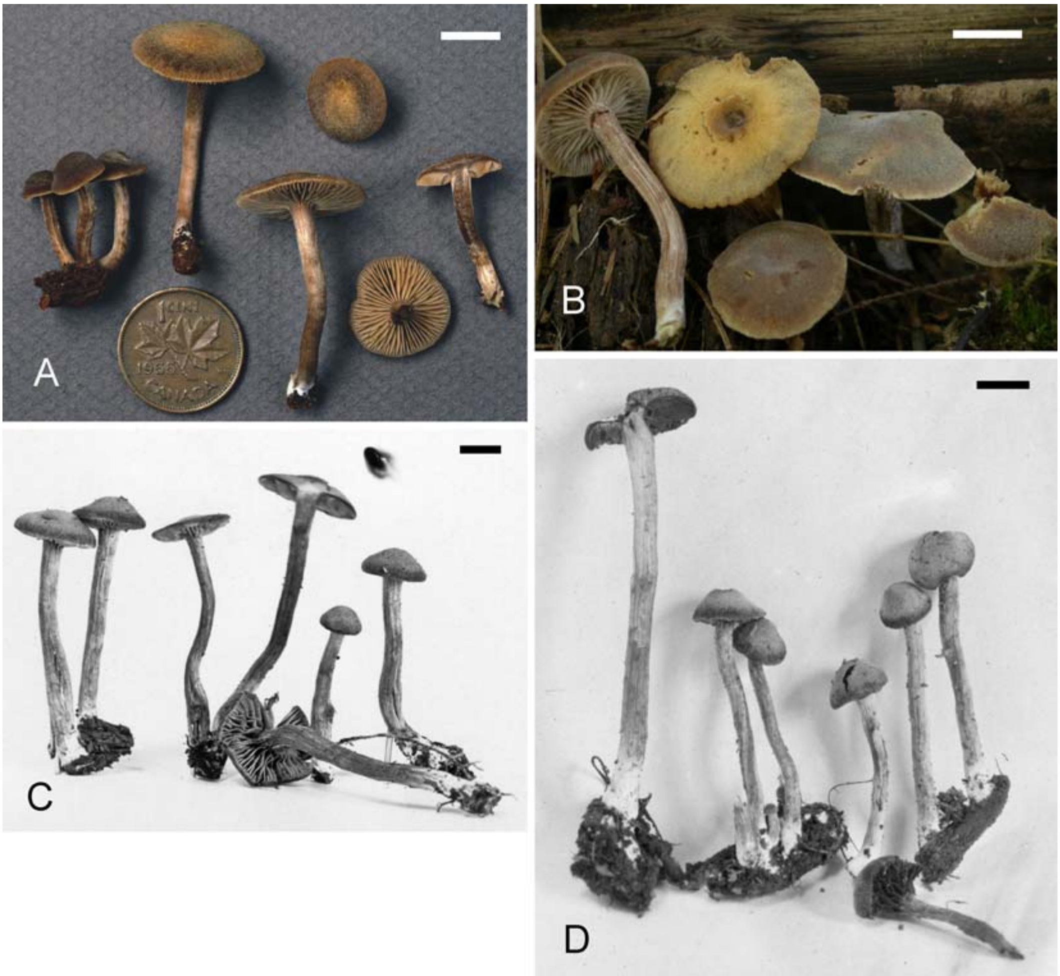

FIG. 1. *Inocybe tubarioides*. **A.** From Quebec (*Lamoureux 1984*, CMMTL), copyright Cercle des mycologues de Montréal—Yves Lamoureux, reproduced with permission. **B.** In situ from Massachusetts (*PAM USA06–49*, LIP). **C.** Paratype (No. *15294*, CUP), reproduced with permission. **D.** Holotype (No. *15238*, CUP), reproduced with permission. Scale bars = 1 cm.

or more often bare or covered with mucilaginous secretions, hyaline but occasionally ochraceous or bright yellow in 5% KOH; two distinct types: (i) those with colorless, thin-wall, and without apical incrustations; (ii) those with yellow, distinctly thickened wall at the apex, at times mucoid or faintly crystallized, and longer in size; apical deposits metachromatic in cresyl blue. Cheilocystidia similar to pleurocystidia type (i) but smaller in size, infrequent, often thin-walled, mixed with saccate to short clavate hyaline paracystidia, 11–18 × 6–13 µm. Lamellar trama regular, brownish yellow or pale brown in mass, hyphae cylindric to inflated, at times with weak incrustations, up to 20 µm diam., frequently septate. Stipitipellis with caulocystidia similar to cheilocystidia mixed with septate cauloparacystidia, multiseptate cauloparacystidioid cells at times observed near the center of the stipe, but none above the stipe base, caulocystidia not observed below extreme stipe apex. Pileipellis a trichoderm, 50–60 µm broad, composed of prostrate fascicles of catenulate cells 4–13 µm diam., mostly incrusted with yellowish pigment, often with secondary unclamped septa, with numerous terminal elements cylindric or attenuate at the apices, 14–45 ×

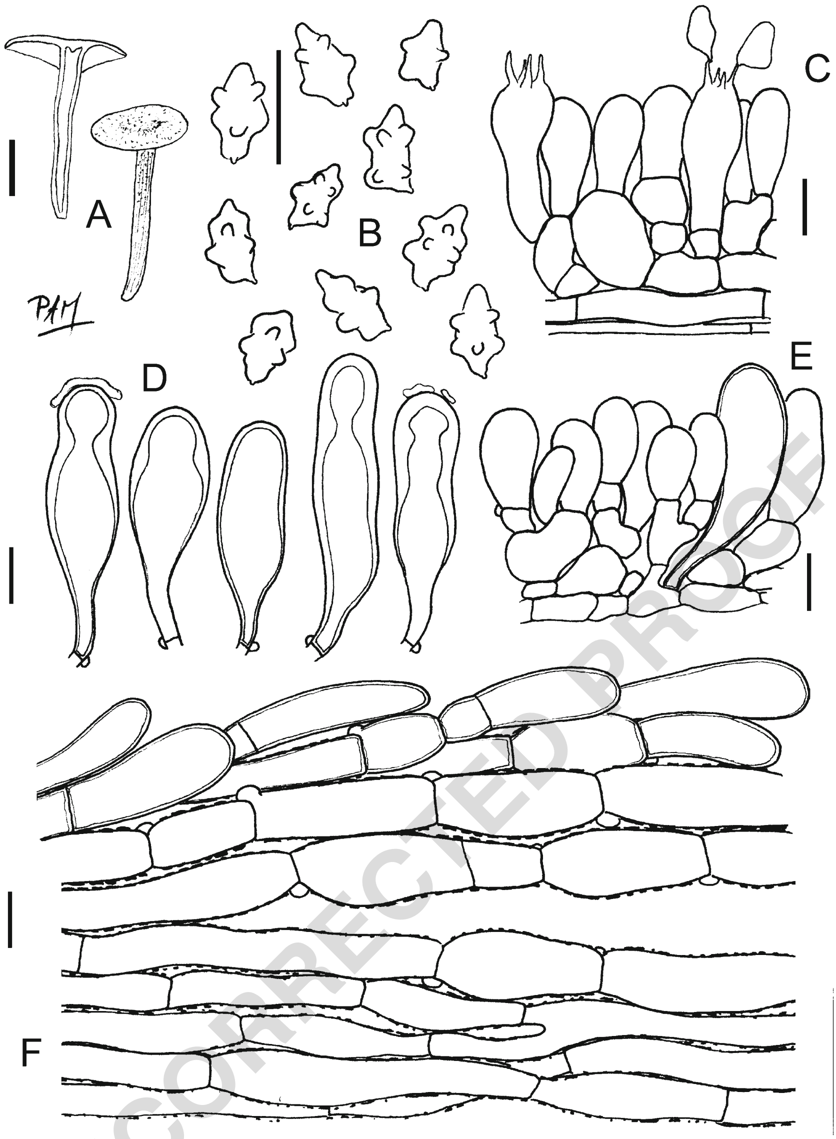

Fig. 2. Gross morphological and anatomical features of *I. tubarioides*. **A**. Fruiting bodies (bar = 10 mm). **B**. Basidiospores. **C**. Basidia and subhymenium. **D**. Pleurocystidia. **E**. Cheilocystidia and paracystidia. **F**. Pileipellis (bar = 10 µm for all anatomical features). (From *PAM USA06–49*, LIP.)

5–9 µm, usually smooth; subterminal cells often shortened or isodiametric; subpellis not differentiated; tramal hyphae more or less parallel with yellowish incrusted walls, laticiferous hyphae infrequent or not observed. Clamps frequent.

Distribution and ecology.—Scattered singly or in small clusters on rotten logs, woody debris, or rotten trunk of *Pinus strobus*, type of wood rot not determined; also reported under *Pinus* and *Rhododendron* (Smith & Helser, 1938) and in stands of mixed hardwoods (Stuntz, 1954); in mixed conifer-hardwood forests of *Fagus*, *Betula*, *Tsuga*, and *Picea*; or mixed forest of *Quercus*, *Carya*, *Tsuga*, and *Pinus*; or in mixed forest of *Pinus* and *Quercus*; or on soil in dry open aspen (*Populus*) woods. Reported from New York, New Hampshire, Massachusetts, Tennessee, North Carolina, and Michigan in the United States, and Quebec in Canada.

Phenology.—July to September.

Etymology.—Named *tubarioides* by Atkinson (1918) due to resemblance to *Tubaria furfuracea*.

Additional specimens examined. CANADA. Quebec: Mascouche, approximately 25 km from Montreal, on rotten wood in a mixed forest of *Tsuga canadensis*, *Quercus rubra*, and *Fagus grandifolia*, 18 Aug 1993, *Lamoureux 1984* ("CMMTL").

UNITED STATES. Massachusetts: Oak Hill, Littleton, on a small rotten trunk of *Pinus strobus* in mixed *P. strobus-Quercus rubra* forest on granite, 24 Jul 2006, leg. *P.-A. Moreau*, *PAM USA06-49* (TENN, LIP). **Michigan**: Grapevine Point, University of Michigan Biological Station, Douglas Lake, Cheboygan County, 19 Jul 1947, leg. *M. Lange*, *Stz. 2882* (WTU, in two separate boxed collections); Colonial Point, Burt Lake, 31 Jul 1947, on wood, leg. *H. Imshaugh* (TENN 018207); Douglas Lake, 5 Jul 1949, *Stz. 5084* (WTU); Ringwood, near Ithaca, 4 Aug 1947, *Stz. 3058* (WTU); Carp Creek, near Douglas Lake, 27 Jul 1951, leg. *A. H. Smith* (DAOM 27949 *n.v.*); Topinabee, Burt Lake, caespitose on ground, 3 Jul 1953, leg. *M. Barr, Stz. 7676* (WTU); University of Michigan Biological Station, Douglas Lake, on log, 7 Jul 1953, leg. *S.C. Hoare* (DAOM 40103 *n.v.*); Burt Lake, Colonial Point, Cheboygan County, 10 Aug 1957, *Stz. 10137* (WTU); area near Rees' Bog, Cheboygan County, gregarious on sandy soil in dry open aspen (*Populus*) woods, 5 Jul 1957, *R. L. Shaffer 1389* (MICH 68327). **New Hampshire**: Discovery Trail, Highway 126, White Mountains National Forest, in mixed forest of *Fagus*, *Betula*, *Tsuga*, *Picea*, 8 Aug 2004, *PBM 2570* (TENN). **New York**: McGowan's woods, near Ithaca, on rotten wood, 17 Jul 1903, leg. *C. H. Kauffman*, CUP-A-*015238* (HOLOTYPE, CUP-A; ISOTYPE, WTU); CUP-A-*015294* (PARATYPE, CUP and MICH 68336); CUP-A-*018350* (PARATYPE, CUP). **North Carolina**: Pisgah National Forest, western North Carolina, Mycological Society of America Foray, on ground with woody debris in mixed forest of *Quercus*, *Carya*, *Tsuga*, *Pinus*, 17 Jul 2004, leg. *M. Padamsee*, *PBM 2550* (TENN, F); Highlands, under *Pinus*, 10 Sep 1937, *L.R. Hesler & A. H. Smith* 7528 (TENN, *n.v.*, MICH 68337); Flat Creek, Great Smoky Mountains National Park, on decayed wood, 27 Aug 1938, *A. H. Smith 10597* (MICH 68338). **Tennessee**: Cades Cove Loop Road, Great Smoky Mountains National Park, in mixed forest of *Fagus*, *Quercus*, *Carya*, *Juglans*, *Pinus*, *Tsuga*, 18 Aug 2005, leg. *E. B. Lickey, TENN 061324* (=*TFB12757*) ITS sequence: EU439453 (TENN); Grassy Patch, Great Smoky Mountains National Park, scattered under *Pinus* and *Rhododendron*, 3 Sep 1937, *L. R. Hesler & A. H. Smith 7355* (TENN, *n.v.*); same locality as above, on decayed logs, *A. H. Smith 9825* (MICH 68333); same locality as above, on wood under *Rhododendron*, 22 Aug 1938, *A. H. Smith 10407* (MICH 68330); same locality as above, on debris, 22 Aug 1938, *A. H. Smith 10414* (MICH 68334); same locality as above, on humus, 26 Aug 1938, *A. H. Smith 10546* (MICH 68329); same locality as above, on wood under *Rhododendron*, *A. H. Smith 10632* (MICH 68328); Husky Gap Trail, Great Smoky Mountains National Park, on debris, 14 Aug 1938, *A. H. Smith 9713* (MICH 68331); Indian Camp Creek, Great Smoky Mountains National Park, on wood, 30 Aug 1938, *A. H. Smith 10650* (MICH 68332).

Inocybe tubarioides exhibits a combination of characters unusual in the genus *Inocybe*, namely, the lignicolous habit and strongly hygrophanous pileus. A few other species of *Inocybe* typically occur on rotten wood, e.g., *I. lanuginosa* (Bull.:Fr.) P. Kumm., but their outward appearance is typical for the genus. In our estimation, a generic determination is not possible without microscopic examination, if one is not already familiar with the species. Some specimens retain their hygrophanous nature after drying, and all herbarium specimens consistently appear on wood or woody debris with the exception of *Stz. 7676* and *R.L. Shaffer 1389*, which were recorded on soil from Michigan.

Despite these peculiar traits, Bayesian and ML phylogenetic analyses of *rpb1*, *rpb2*, and nLSU-rRNA genes unequivocally place *I. tubarioides* in *Inocybe* s. str. or the "Inocybe clade" (Fig. 3) where it is nested with two other species, *I. relicina* (Moser, 1978; type of *Inocybe*) and *I. tahquamenonensis* (Stuntz, 1954; Matheny & Kropp, 2001). This cluster of three species receives significant ML bootstrap support (76%) and a significant posterior probability (1.0). Posterior probability values were calculated from 5386 trees sampled from the posterior distribution. We refer to this clade as sect. *Inocybe*. All three species share the possession of nodulose basidiospores (± cruciform in *I. relicina* and *I. tahquamenonensis*, rarely so in *I. tubarioides*), but no other unique morphological and ecological characters suggest any common ancestry. *Inocybe relicina* is a *Picea*-associate fruiting in *Sphagnum* bogs and endemic to regions of Fennoscandia. Morphologically, *I. relicina* is scaly, dark umber in color, and has yellow lamellae when young. *Inocybe tahquamenonensis* is a putative hardwood associate restricted to deciduous forests in eastern North America and is scaly throughout, but is chiefly characterized by its fuscous-purple colors and vinaceous lamellae. *Inocybe tubarioides* lacks pronounced squamules and conspicuous yellow or vinaceous pigments, but Smith and

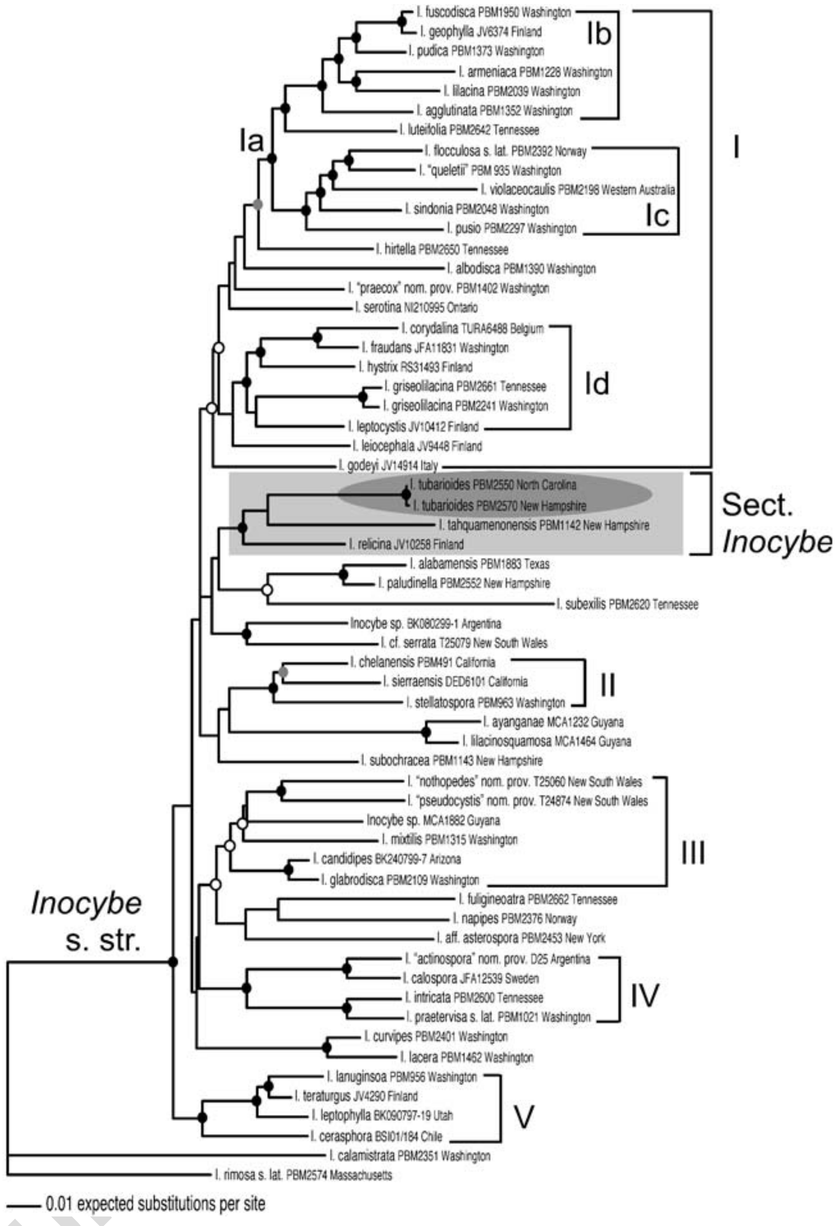

Fig. 3. Phylogram of tree with the highest ML score (ln L -35616.863) from a Bayesian analysis of 58 exemplars of *Inocybe* s. str. or the "Inocybe clade", including *I. tubarioides*, plus two outgroups. Black-filled circles indicate nodes that receive both significant PP and ML bootstrap values; gray-filled circles indicate nodes that receive a significant ML bootstrap value only; empty circles indicate nodes with a significant PP only. Clade designations follow Matheny (2005).

Hesler (1938) noted that the color of young lamellae could be pallid vinaceous brown.

Singer (1986) diagnosed members of sect. *Inocybe* as species bearing a cortina (partial veil); a brown stipe that is often fibrillose, woolly, or scaly, and not pruinose the entire length; stipe base not marginately bulbous; caulocystidia absent from the center of the stipe and below; smell inodorous or inconspicuous; and with well-developed pleurocystidia lacking strongly thickened walls. Singer then divided sect. *Inocybe* into two “stirps” or groups: “Umbrina” and “Lanuginosa”. *Inocybe relicina* was designated in stirps “Lanuginosa”, along with *I. longicystis* G. F. Atk. (a synonym of *I. stellatospora* (Peck) Massee: Matheny & Kropp, 2001), *I. cerasphora* Sing., and *I. ovatocystis* Boursier & Kühn., the latter now representing *I. lanuginosa* (Bull.: Fr.) P. Kumm. (see epitypification in Matheny & Kropp, 2001). As Fig. 3 illustrates, Singer’s stirps “Lanuginosa” is polyphyletic with species clustering in clades II, V, and what we designate as sect. *Inocybe*. At least two additional species may belong to sect. *Inocybe* based on morphological descriptions very similar to *I. tahquamenonensis*: *I. magnifica* (E. Horak) Garrido, a *Nothofagus* associate from Papua New Guinea (Horak, 1979), and *I. leptoderma* Takah. Kobay. & Nukada, probably a *Fagus* associate from Japan (Kobayashi, 2002). Like *I. tahquamenonensis*, both species share red colored context, some spores that are ± cruciform in outline, dark overall coloration, and squamulose pileus and stipe.

In total we are aware of 29 collections of *I. tubarioides*, all from eastern North America. 27 collections are cited here, but two additional Michigan materials (*No. 82784* and *82773*) collected by Rolf Singer in 1953 are stored at the Field Museum. *Inocybe tubarioides* has not been recorded since 1957. Here we report the species for the first time from the New England states New Hampshire and Massachusetts and from Canada in Quebec. *Inocybe tubarioides* is also recorded from the southern Appalachian Mountains of North Carolina and Tennessee (Smith & Hesler, 1938), New York (Atkinson, 1918), and Michigan (Stuntz, 1954). Thus, since 1957 *I. tubarioides* has been collected and preserved in herbaria by only five additional collections.

Although endemism has been suggested to be low in *Inocybe* (Kuyper, 1986), all three confirmed members of sect. *Inocybe* appear to be short or narrow range endemics and documented from relatively few herbarium collections (Moser, 1978; Matheny & Kropp, 2001). Both *I. tubarioides* and *I. tahquamenonensis* appear to be sympatric in their distribution in eastern North America. We predict that habitats that harbor these fungi may exhibit attributes (age, abiotic soil factors, elevation, latitude, composition of plant community) that are localized, unusual in combination, and infrequent, hence the rare status of these fungi. We also suggest that due to their rare status, these fungi are potentially threatened and may be indicators of habitats that are of high conservation value. Several biases, however, may influence our understanding of the geographic distribution of *I. tubarioides*: the species may be easily overlooked, misidentified, or undetermined to genus due to a combination of features not typical for the genus *Inocybe* in general.

Two collections at NY are mislabeled *I. tubarioides*: one (No. *673235*, NY) from the Chiricahua Mountains in Arizona from 1998 exhibits a “fine silky ± rimose” pileus, has soil, not wood, at the base of the stipe, and the determination (by R. Fatto) is admittedly speculative. Examination of this material (*Fatto 1097*) shows spores similar to *I. curvipes* P. Karst.; the second *(Murrill 209)* from New York, a split of which is located at MICH (*68335*) was labeled “*I. tubarioides*” by C. H. Kauffman “in all probability”, but the stipes are caulocystididate below the center, and the spores are of the *petiginosa*-type. We believe this material better represents *I. subexilis* (Peck) Sacc.

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No Query.