
Inocybe parvicystis

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Inocybe parvicystis F.J. Rodr.-Campo & Esteve-Rav., *sp. nov.*

Etymology. From Latin *parvus* and *cystidium*, referring to the small size of cystidia.

Classification — *Inocybaceae*, *Agaricales*, *Agaricomycetes*.

Basidiomata agaricoid and stipitate. *Pileus* 15–40 mm, convex to plano-convex, not or hardly umbonate, not or very slightly hygrophanous; margin deflexed to straight, often wavy with age, in young basidiomes often showing appendiculate rests of the velipellis; colour initially very pale, cream whitish (Mu 7.5Y 9/2), then yellow ochraceous (Mu 10YR 6/6) or pale yellowish brown (Mu 7.5Y 8/4), in old or washed specimens often becoming copperish yellow to orange yellow (Mu 7.5YR 3/6), often paler at the centre or in areas where velipellis is present; surface smooth, becoming radially fibrillose at margin but never rimose, often agglutinating soil remains, when young covered by white to greyish velipellis, often persisting in old specimens, especially towards the centre. *Lamellae* rather crowded (L = 36–44), adnexed to emarginate, ventricose, with lamellulae (l = 1–2), initially pale grey to beige, then yellowish brown with a faint olivaceous reflection at maturity, edge whitish to concolorous, crenulate. *Stipe* 35–55 × 5–8 mm, straight to curved towards base, cylindrical with a bulbous to abruptly bulbous base, less often subbulbous or clearly marginate bulbous, bulb 8–10.2 mm wide; colour whitish (Mu 7.5Y 9/2), ochraceous (Mu 10YR 6/6) or even yellowish brown (Mu 7.5Y 8/4) in old basidiomes, often concolorous to pileus in aged specimens, especially towards base; surface sparsely fibrillose, fibrillose-pruinose towards the apex (descending to 1/6–1/4, rarely –1/3), sometimes covered by abundant fibrillose veil towards the lower half in young basidiomes. *Context* fibrose, whitish, unchanging. *Smell* slightly spermatic, *taste* slightly raphanoid. *Spores* (7.5–)8–9–10 (–11.5) × (4.5–)5–5.5–6(–6.5) µm, Qm: 1.25–1.6–2 (n = 165), smooth, yellowish, ellipsoid to mostly amygdaliform to rhomboid with subogival apex, most often showing a typical 'callus' or sometimes a small and distinct germ pore at the apex, walls –0.5 µm thick. *Basidia* (25.5–)27–31.5–36.5(–46.5) × (6.5–)8–9–10(–12.5) µm (n = 32), (2–)4-spored, clavate. *Lamella edge* practically sterile, composed by numerous cheilocystidia and more or less common clavate to pyriform paracystidia, hyaline to yellowish in some specimens. *Cheilocystidia* very numerous, not protruding, narrow, (30.5–)34–43–46(–54.5) × (8–)8.5–9.5–11.5(–12.5) µm (n = 41), cylindrical, subfusiform or subclavate, often attenuate pedicellate towards base and with sinuose outline, heavily crystalliferous at the apex, walls (1.5–)2–3 µm thick, moderately to pale to distinctly yellow in 5 % NH_4OH. *Pleurocystidia* numerous, similar to cheilocystidia, (35–)37.5–45.5–52(–56) × (7–)8.5–10–12(–13.5) µm (n = 51). *Hymenophoral trama* regular, formed by cylindrical to ellipsoidal cells, 4–20 µm wide. *Stipitipellis* a cutis bearing sparse caulocystidia at the apex (so 1/6–1/4, rarely –1/3), similar to hymenial cystidia and often broader, (34.5–)35.5–42(–43.5) × (9–)9.5–13(–15.5) µm, mostly crystalliferous, accompanied by cylindrical, sublageniform, clavate or pyriform paracystidia. *Pileipellis* a cutis formed by parallel cylindrical cells (< 6 µm) with some yellowish incrusting pigment, slightly gellified in wet condition. *Clamp connections* present in all tissues.

Habitat & Distribution — Gregarious in acidic soils under evergreen Mediterranean oaks (*Quercus ilex*, *Q. suber*), sometimes mixed with *Cistus* bushes; often found half-buried in soft or sandy soils. Known from Spain, but probably widespread in the Mediterranean in similar habitats.

Typus. Spain, Comunidad de Madrid, Madrid, Villa del Prado, 30T 039074–445661, 450 m, in humus of *Quercus ilex* subsp. *ballota* forest, in acidic soil, 29 Dec. 2014, *F.J. Rodríguez-Campo*, *A. Díaz-Fernández & J.A. Rodea-Butragueño* (holotype AH 46600, isotype PRC-141229, ITS sequence GenBank KY349121, MycoBank MB819706).

Additional specimens examined. See MycoBank MB819706.

Notes — Colour codes are taken from Munsell (1994), terminology follows Vellinga (1988) and Kuyper (1986). The presence of a well-developed velipellis, pale yellow-ochraceous colour, bulbous stipe, caulocystidia reduced to the upper 1/4 of the stipe, hymenial cystidia short, narrow, pedicellate and very crystalliferous, and spores provided with a 'pseudopore' in most cases, are distinct features of *I. parvicystis*. It grows in acidic soils in evergreen oak forests (*Quercus ilex*, *Q. suber*), often mixed with maquis (*Cistus* spp.) vegetation in the western Mediterranean areas. Among other leiosporeous species showing short cystidia and a bulbous stipe, *I. mystica* is devoid of velipellis, its colours are warmer orange-ochraceous, the spores are devoid of a germ pore and smaller (7.5–)8.5–9.4(–9.7) × (4.7–)5.2–5.7(–5.8) µm, Qm: 1.45–1.6–1.8 (n = 30), holotype measurements); it develops in frondose temperate forests in Europe (Stangl & Glowinski 1980). Kuyper (1986) considered the American species *I. cryptocystis* conspecific with *I. mystica*, but the results of our ITS analyses from both prove that, though phylogenetically closely related, they are distinct species. *Inocybe cryptocystis* (Stuntz 1954) is also devoid of a distinct velipellis and shows very short, mostly subutriform to oblong-ellipsoid cystidia, with obtuse to truncate, non-pedicellate base. The interpretation of *I. confusa* in Heim (1931), could well be referred to *I. parvicystis*; Heim's description fits the general characters of the new species, and the habitat is said to be 'Mediterranean, under evergreen oaks'; unfortunately, no voucher material has been preserved of Heim's collections.

ITS sequences of *I. parvicystis* do not seem related to those generated from *I. cryptocystis* or *I. mystica* type collections. The most closely related ITS sequences come from ectomycorrhizae studies in Californian oaks (KC791069, Taniguchi et al. 2013) and Pakistani Himalayan pine forests (KF679813, Hanif & Khalid, unpubl.). Both collections gathered under *Abies pinsapo* (AH 18898, 18899) differ from *I. parvicystis* because of their paler colour. They probably represent an independent phylogenetic lineage different from *I. parvicystis*, as the ITS sequence produced from one of them had up to 19/562 bp different from the other *I. parvicystis* samples (including 4-bp and 7-bp insertions, and a 3-bp deletion not observed in any other sequence of the latter species). Collections studied by the authors are indicated in **bold** in the phylogenetic tree for ITS sequences (see figure in MycoBank).

Colour illustrations. Spain, Madrid, Villa del Prado, open forest of *Quercus ilex* subsp. *ballota*, area where the holotype was collected; from top to bottom: basidiomata, spores, pleurocystidia, cheilocystidia, caulocystidia (all from holotype). Scale bars = 1 cm (basidiomata), 10 µm (microscopic elements).

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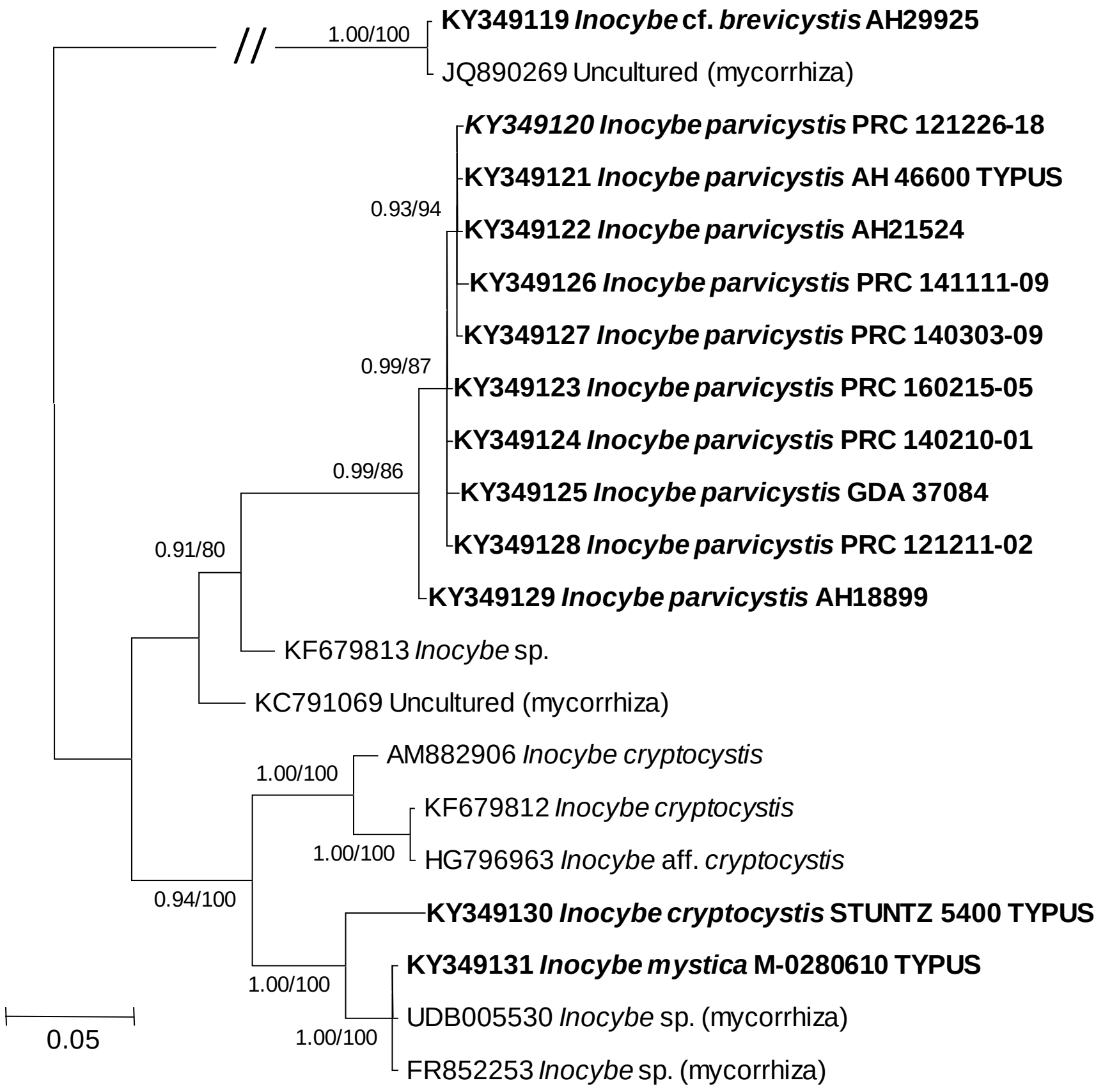
KY349119 Inocybe cf. brevicystis AH29925
1.00/100
JQ890269 Uncultured (mycorrhiza)
KY349120 Inocybe parvicystis PRC 121226-18
KY349121 Inocybe parvicystis AH 46600 TYPUS
0.93/94
KY349122 Inocybe parvicystis AH21524
KY349126 Inocybe parvicystis PRC 141111-09
KY349127 Inocybe parvicystis PRC 140303-09
0.99/87
KY349123 Inocybe parvicystis PRC 160215-05
KY349124 Inocybe parvicystis PRC 140210-01
0.99/86
KY349125 Inocybe parvicystis GDA 37084
KY349128 Inocybe parvicystis PRC 121211-02
0.91/80
KY349129 Inocybe parvicystis AH18899
KF679813 Inocybe sp.
KC791069 Uncultured (mycorrhiza)
AM882906 Inocybe cryptocystis
1.00/100
KF679812 Inocybe cryptocystis
1.00/100
HG796963 Inocybe aff. cryptocystis
0.94/100
KY349130 Inocybe cryptocystis STUNTZ 5400 TYPUS
KY349131 Inocybe mystica M-0280610 TYPUS
1.00/100
UDB005530 Inocybe sp. (mycorrhiza)
1.00/100
FR852253 Inocybe sp. (mycorrhiza)
0.05