PERSOONIA
Volume 19 / 2: 227–232 (Published 8 August 2007)

A NEW CORTICICOLOUS SPECIES OF THE GENUS TUBULICIUM (POLYPORALES) FROM SOUTHERN SPAIN

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A new *Tubulicium* species from Mediterranean evergreen forests of southern Spain is described, viz. *Tubulicium papillatosporum* G. Moreno & Esteve-Rav. It is characterized by its papillate basidiospores and habitat on bark of living *Quercus canariensis*. A bibliographical revision of this genus is presented, and the new combination *Tubulicium macrosporum* is proposed.

Key words: Polyporales, *T. macrosporum, T. papillatosporum*, Mediterranean area, Panama, taxonomy.

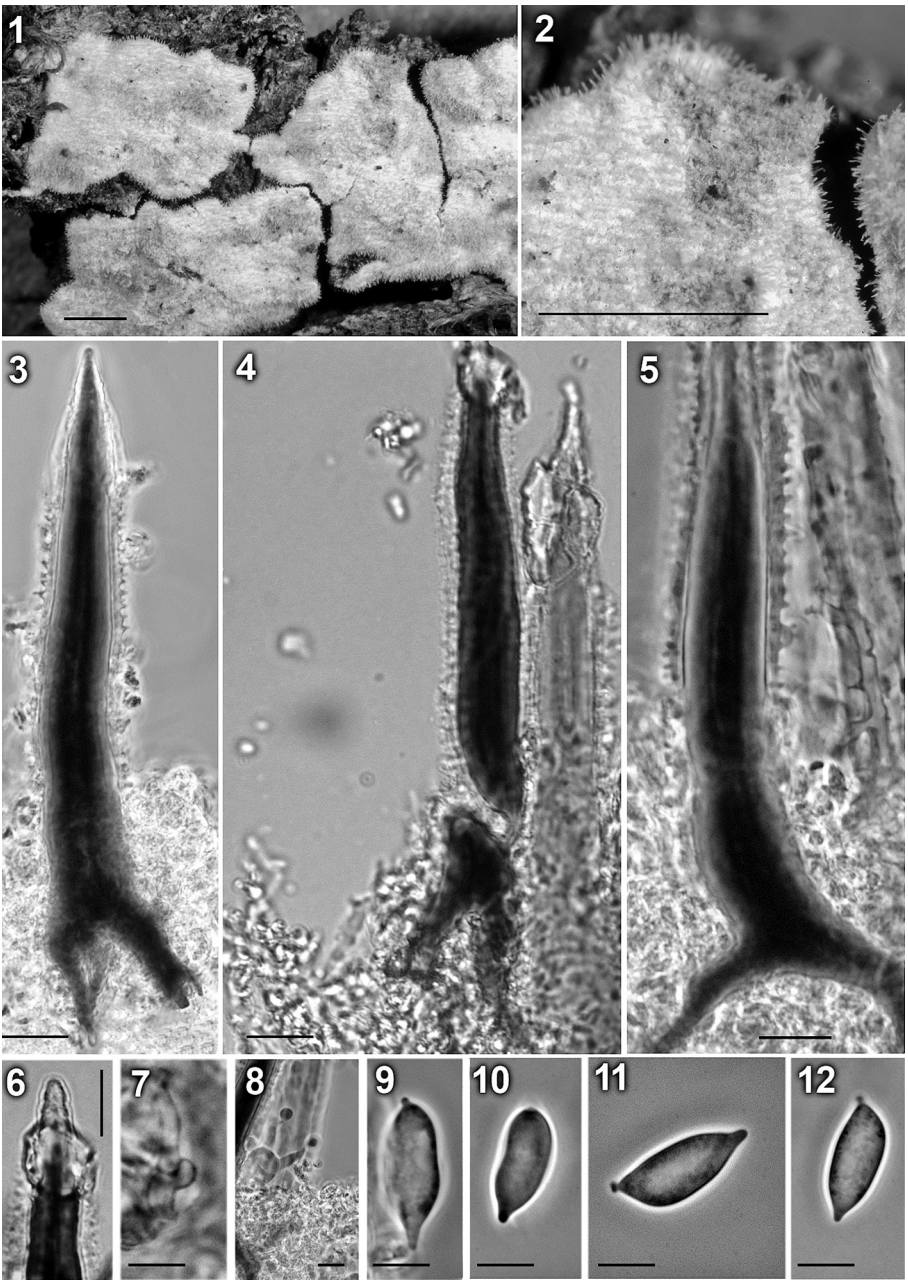
The genus *Tubulicium* was described by Oberwinkler (1965), on the basis of the type species *Peniophora vermifera* Bourd. The protologue reads as follows: "Genus *Hymenomycetum corticioideum*. Carposoma effusum, tenue vel tenuissimum, subgelatinosum, sub lente hispidum. Hyphae agglutinatae, plus minusve indistinctae, hyalinae. Cystidia conica, basi multi-radicosa, tunicis crassis. Basidia ± clavati-pedunculata vel cylindrici-pedunculata, basi attenuata (podobasidia), ± singula formata. Sporae non coloratae".

Some years later, Hjortstam et al. (1988) characterized this genus by "fruitbodies resupinate, effuse, closely adnate, almost smooth but strongly hispid by protruding cystidia, hyphal system monomitic, all hyphae clamped, cystidia numerous, robust and mostly multi-rooted, thick-walled throughout, strongly encrusted and covered with coralliform hyphae, basidia clavate, more or less pedunculate, thin-walled, as a rule with four stout sterigmata, spores smooth, thin-walled, inamyloid, indextrinoid and without cyanophilous reaction". These authors emphasize the presence of "cystidia covered with coralliform hyphae", which are not present in the closely related genera *Litschauerella* Oberw. and *Tubulicrinis* Donk. Subsequently, Kirk et al. (2001) placed *Tubulicium* in the family Tubulicrinaceae Jülich within the order Polyporales Gäum., and recognized 7 species in this genus.

In this contribution, a new species is described which was collected in Mediterranean ecosystems from southern Spain. Also, a new combination in *Tubulicium* is proposed for a *Xenasma* species originally described from Panama.

MATERIAL AND METHODS

Material of the new species *Tubulicium papillatosporum* was found growing on bark of old living trees of *Quercus canariensis*, about 1.2–2 m above the ground, in northern exposition, typically developing within cavities surrounded by bryophytes.



Figs. 1–12. *Tubulicium papillatosporum* (holotype). 1. Resupinate fruit bodies; 2. detail of the hispid hymenophore; 3–5. dextrinoid cystidia covered with coralliform hyphae and showing multi-rooted base; 6. cystidium apex with inclusions; 7. clamp; 8. basidium showing long sterigmata; 9–12. papillate basidiospores. Scale bars: 1–2 = 1 mm; 3–12 = 10 μm. Photos G. Moreno.

The type material is deposited in AH (Departamento de Biología Vegetal, Universidad de Alcalá, Spain) and a duplicate is kept in the mycological JA 7027.

Digital photographs were taken with a Nikon camera, model DS-5M, mounted to a binocular Nikon eclipse 80i microscope.

Melzer, distilled water and a solution of 5% KOH were used for microscopical observations.

TAXONOMY

Tubulicium papillatosporum G. Moreno & Esteve-Rav., *spec. nov.* — Figs. 1–12

Fructificatio effusa, in sectione usque ad 0.2 mm crassa, alba vel albocremea, sub lente hispida. Systema hypharum monomiticum, hyphae septatae, fibulatae, dendroideae, 1–2 μm latae. Basidia 25–30 × 8–10 μm, cylindracea vel subclavata, pleurobasidiata, 4-spora. Basidiosporae 17–23 × 7–10 μm, longe amygdaliformes et apicaliter appendiculatae, hyalinae, tenuituicatae, leves, inamyloideae. Cystidia 100–140 × 12–20 μm, acutoconica, ad basim multiradicata, crassitunicata, hyphis dendriformibus cylindraceisque circumdatis, 1–2.5 μm latis, basim versus membrana dextrinoidea instructa.

Holotypus: Hispania, Cádiz, Los Barrios, Carril de San Carlos del Tiradero, 30STF6704, 250 m, ad corticem *Quercus canariensis* viventis, leg. G. Moreno & F. Esteve-Raventós, AH 31894.

Etymology: papillatus (Lat.): papillate, spora (Lat.): spore. – Name relates to the papilla at the apex of the basidiospores.

Basidiomata 0.2–0.7 × 0.1–0.3 cm, forming isolate to confluent colonies, irregularly shaped, either ellipsoid, rectangular or elongate, more or less sinuate, whitish to cream when mature, up to 0.2 mm thick, very fragile and powdery, with hispid surface owing to the presence of abundant protruding cystidia. Margin entire, covered by cystidia. Crystals abundant on the surface of the basidiomata.

Hyphal system monomitic. Trama formed by ascendant cylindrical hyphae, septate, 2–3 μm wide, at apex dendrophysoid, diverticulae 1–2 × 1 μm, dense and clamped. Basidia 25–30 × 8–10 μm, cylindrical to subclavate, more or less pleurobasidiate, 4-spored, very sparse. Basidiospores 17–23 × 7–10 μm, smooth, neither amyloid nor dextrinoid, acyanophilous, broadly amygdaliform with a more or less protruding apical papilla variable in length. Cystidia very abundant, 100–140 × 12–20 μm, conical, with a multi-rooted broad base and very acute apex, most of them strongly dextrinoid and thick-walled, typically wrapped into a layer of cylindrical and coralloid hyaline hyphae, 1–2.5 μm wide. Crystals abundant in hymenium.

Material studied: SPAIN, Cádiz, Los Barrios, Carril de San Carlos del Tiradero, proximidades de La Tabernilla, 30STF6704, 250 m, on living bark of *Quercus canariensis*, leg. G. Moreno & F. Esteve-Raventós, AH 31894 (holotype). Isotype in JA-Cussta.

SOME COMMENTS AND A BIBLIOGRAPHICAL SURVEY OF SPECIES REFERRED TO TUBULICIUM

According to Kirk et al. (2001), *Tubulicium* includes 7 species, e.g.: *T. dussii* (Pat.) Oberw. ex Jülich, *T. filicicola* (G. Cunn.) Oberw., *T. junci-acuti* Boidin & Gaignon, *T. ramonense* Kisim.-Hor., Oberw. & L.D. Gómez, *T. raphidosporum* (Boidin & Gilles) Oberw., Kisim.-Hor. & L.D. Gómez, *T. vermiculare* (Wakef.) Boidin & Gilles and *T. vermiferum* (Bourdot) Oberw. ex Jülich.

Oberwinkler (1965) erected the genus *Tubulicium* based on an invalid description of *T. vermiferum* (Bourdot) Oberw., later validated by Jülich (1979). This species differs from *T. papillatosporum* by the narrow and fusoid-claviform basidiospores, measuring 16–24 × 3.5–4.5 μm, with typical tapering ends. According to Bourdot & Galzin (1928) it is very abundant at the base of stems of *Erica arborea*, and rarely on *Calluna vulgaris*; it is occasionally found on *Rhododendron*, *Alnus* and *Acer* (Boidin & Gaignon, 1992); its distribution reported from western Europe, North America and New Zealand (Cunningham, 1963).

Tubulicium dussii was originally described as *Hypochnus dussii* from Guadaloupe Island by Patouillard (1899). It is characterized by its small spores, 6–7 × 2.5–3 μm, curved and strongly tapering at the apex, and its habitat on old stems of the fern *Alsophila aspera* (L.) R.Br. (Cyatheaceae). It is recorded only from Central America (Boidin & Gaignon, 1992).

Tubulicium filicicola was originally described as *Tubulicrinis filicicola* from New Zealand by Cunningham (1963). It has small basidiospores, 6–8 × 2 μm, which are allantoid with a blunt apex, and grows on trunks of the tree fern *Cyathea dealbata* (G. Forst.) Sw. (Cyatheaceae). It is only known from New Zealand (Boidin & Gaignon, 1992).

Tubulicium vermiculare was first found on Reunion Island (Boidin & Gilles, 1986). It also grows on ferns like *Cyathea excelsa* Sw. and *C. borbonica* Desv. (Cyatheaceae); and the very curved basidiospores measure 8.5–10 × 2.5–3(–3.5) μm. It is recorded both from New Zealand (Boidin & Gaignon, 1992) and Costa Rica (Kisimova-Horovitz et al., 1998).

Tubulicium junci-acuti is a species growing on sheaths of *Juncus acutus* L. (Juncaceae) and was originally described from Corsica (Boidin & Gaignon, 1992). It is characterized by the bi-apiculate, more or less curved basidiospores of 15–20 × 3–4.25 μm. The thin-walled cystidia are neither encrusted nor wrapped into coralloid hyphae; these features suggest that this taxon may belong to another genus.

So far *Tubulicium ramonense* was exclusively found in Costa Rica, on rotten petioles of palms (Kisimova-Horovitz et al., 1998); the large ovoid spores measure 15–18 × 5–6.5 μm.

Tubulicium raphidosporum, originally described by Boidin & Gilles (1986) as *T. vermiferum* subsp. *raphidosporum* was later considered by Kisimova-Horovitz et al. (1998) as an autonomous species. It features long and narrow basidiospores, (18–)20–32 (–36) × (2–)2.5–3.5(–4.5) μm and grows on *Chrysolidocarpus lutescens* (Palmaceae), *Heliconia sp.* (Heliconiaceae) and *Casuarina cunninghamiana* (Casuarinaceae). It is reported from Africa and tropical Asia (Boidin & Gaignon, 1992) as well as Costa Rica (Kisimova-Horovitz et al., 1998).

Finally, the new species *Tubulicium papillatosporum* is clearly distinguished by the broadly amygdaliform basidiospores (width 7–10 μm) with apical papilla, and by the cystidia with a broad base (17–20 μm) and its Mediterranean distribution; the substrate is bark of living 'Andalusian oak' (*Quercus canariensis*, Fagaceae).

OTHER TAXONOMIC CONCLUSIONS

During the bibliographical survey on the genus *Tubulicium* and the closely related genera *Epithele* (Pat.) Pat. and *Xenasma* Donk, we have come across a paper written

by Liberta (1960). According to this author *Xenasma macrosporum,* described from Panama, is characterized by the conical, thick-walled cystidia with a broad and multi-rooted base, which have walls with a dextrinoid reaction and are embedded in coralloid hyphae. According to the current taxonomic interpretation of 'corticioid' fungi these features clearly indicate its position in *Tubulicium*. An exception is Boquiren (1971), who considers *Tubulicium* and *Epithele* as synonyms. Oberwinkler (1965) explicitly mentioned that this species belongs to *Tubulicium*, but a formal combination into *Tubulicium* has never been published:

Tubulicium macrosporum (Liberta) G. Moreno, *comb. nov.*

≡ *Xenasma macrosporum* Liberta, Mycologia 52 (6) (1962 '1960') 899.
≡ *Epithele macrospora* (Liberta) Boquiren, Mycologia 63 (5) (1971) 949.

Original description: Fructificatio effusa, tenuíssima, in sectione 30–50 μm crassa, alutacea, cereo-pruinosa, sub lente hispida; hyphae haud clarae, glutinosae, sustrato parallelae, nodoso-septatae, 1.5–2 μm diam; cystidia conica, basi multi-radicosa, tunica crassa, lamellata, extus a hyphis dendriticis circumtexta, c. 1 μm diam., lamina interiore ad basim pseudoamyloidea, 125–164 × 9.5–22.5 μm; basidia cylindracea vel subclavata, basi biradicosa, haud clara, interdum terminalia et haud radicosa ansa sustenta, 16.5–22.5 × 5–9.5 μm; sterigmata 4, crassa, 9–11 × 2 μm gerentia; basidiosporae hyalinae, tunica tenui, leves, haud amyloideae, indutae, oblonge cylindraceae, oblonge ellipsoideae vel late subnaviculares, 12–19 × 4.5–7 μm.

Panama, Prov. Chiriqui, Valley of upper Rio Chiriqui Viejo, 1600–1800 m, 28.VI.1935, *G.W. Martin 2097* (IA D.P. Rogers; A.E. Liberta), type.

Tubulicium macrosporum differs from *T. papillatosporum* by the oblong-cylindrical, oblong-ellipsoid to broadly navicular basidiospores, 12–19 × 4.5–7 μm, and very thin basidiomata measuring only 3–50 μm thick.

ACKNOWLEDGEMENTS

This contribution has been financed by the Plan Cussta (Consejería de Medio Ambiente, Junta de Andalucía). We are thankful to Dr. P. Daniels for his logistic support during field work in Andalusia. We express our gratitude to Prof. E. Horak for revision of the manuscript and the Latin diagnosis. We are also indebted to Luis Monje and Angel Pueblas (Gabinete de Dibujo y Fotográfico de la Universidad de Alcalá de Henares) for help in preparing the photographic plate.

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