Cryptogamie, Mycologie, 2013, 34 (2): 175-181

Coltricia oboensis sp. nov. from the high elevation cloud forest of São Tomé

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Abstract – *Coltricia oboensis* sp. nov. is described on the basis of two collections made in São Tomé. The species was found emerging among moss mats in high elevation forest at the *Parque Natural Ôbo de São Tomé*. It is characterized by minute, stipitate, pleuropodal basidiomes, large pores, and broadly ellipsoid basidiospores, mostly 6.8-9.0 × 5.0-6.0 µm.

Africa / Coltricioid / Gulf of Guinea / Hymenochaetales / Polypores

INTRODUCTION

The Island of São Tomé is located in the Gulf of Guinea, 255 kilometers off the African west coast. The island is of volcanic origin; it forms part of the oceanic segment of the Cameroon Volcanic Line (CVL), an alignment extending from Cameroon to the north down southerly to Annobón and St Helene. The local orography is dramatic, especially in the central south, with steep mountains culminating at 2024 masl at "*Pico de São Tomé*", in what is now the *Parque Natural Ôbo de São Tomé*.

São Tomé has never been connected to the African mainland. Consequently, all its original biota arose by chance colonization, from ancestors originating from the mainland or nearby islands. Subsequently, long periods of isolation resulted in local speciation, yielding significant endemism. For instance, as far as the flora is concerned, about 14% of the native plants – 81 species – are endemic, along with one endemic genus (Figueiredo 1994, Jones 1994).

If the botanical diversity is well known, especially thanks to the works of Exell (Exell 1944, 1952, 1973), comparatively, the local mycota have been poorly assessed up to now, both in terms of diversity and endemism. As far as larger fungi are concerned, several pioneering works were published by Bresadola (1890, 1891), Bresadola and Roumeguère (1890), Coutinho (1921), and Patouillard (1922). Coutinho (1922) gave a brief account of the Basidiomycetes known by that time (including 106 species of which 50 were "Polyporaceae") and reported 35 additional species. To my knowledge, there has been no updated treatment of the records.

Since the late 2000s, the mycota of São Tomé, especially in the *Parque Natural Ôbo de São Tomé*, have been the object of renewed interest. This has resulted in several notable additions, including the remarkable, small-sized *Phallus drewesii* Desjardin & B.A. Perry (Desjardin and Perry 2009) or *Truncospora*

doi/10.782/crym.v34.iss2.2013.175

oboensis Decock (Decock 2011). Degreef *et al.* (2013) also added for the island the small-sized *Mutinus zenkeri* (Henn.) E. Fisch. and the rare, poorly documented *Blumenavia angolensis* (Welw. & Curr.) Dring.

As a continuation of the study of materials collected by the author in 2011 at the *Parque Natural Ôbo de São Tomé* (Decock 2011, Degreef *et al.* 2013), two specimens of a minute *Coltricioid* species (Hymenochaetales) were examined. Both specimens were found emerging among moss mats, at elevations ranging from approx. 1570 to 1700 masl. Smooth basidiospores pointed toward *Coltricia* Gray. These collections could not be satisfactorily identified as any of the currently described *Coltricia* species (Baltazar *et al.* 2010, Dai 2010, Dai and Cui 2005, Dai and Li 2012, Corner 1991, Ryvarden 2004, Ryvarden and Johansen 1980, Zhou and Tedersoo 2013). Hence, the species is described and illustrated below as *Coltricia oboensis sp. nov.* The ecology of this species and more specifically its trophic relationships are briefly discussed.

MATERIALS AND METHODS

Collection locality. — Specimens were collected in the *Parque Natural Ôbo de São Tomé*, São Tomé, at the *Pico Carvalho* base (Fig. 1a, approx. 00°16.191° N – 006°34.586' E, elev. approx. 1570 masl) and around the *Mesa* bases (approx. 00°15.8' N – 006°33.2' E, elev. approx. 1750 masl. The local vegetation belongs to the mountain / cloud forest ecosystem (Exell 1952).

Material. — Herbarium specimens of the new taxon are preserved at NY (holotype) and MUCL (paratype) (herbarium acronyms are according to Thiers, continuously updated).

Morphology and anatomy. — Specimens were examined in Melzer's reagent, KOH 4%, and Lactic acid Cotton blue. Colors are described according to Kornerup and Wanscher (1981). All microscopic measurements were done in Melzer's reagent. In presenting the range of the size of microscopic elements, 5% of the measurements were excluded from each end and are given in parentheses. The following abbreviations are used: ave = arithmetic mean, Q = the ratio of length/width of basidiospores, and ave_Q = arithmetic mean of the ratio Q.

TAXONOMY

Coltricia oboensis* Decock *sp. nov. **Figs 1b, d, Figs 2a, b**

MycoBank: MB804188

Etymology: This species is named after the locality, the *Parque Natural Ôbo de São Tomé*.

Basidiomata annua, minuta, stipitata, pleuropoda; stipite filiformi, 8-20 mm longo × ≤ 1 mm diametro, ferrugineo, hirsuti, in radiciformen partem; pileo dimidiato, convexo-plano, 3-6 × 5-8 mm, usque 3.5 mm crasso, aurantio-griseo ad brunneo, fibrilloso villosi, prope marginem abrupte inflexo; hymenophorum pororum cum poris variabilis, circularis to elongatis, 2-3 per mm; systema hypharum monomiticum; hyphae generatoriae simpliciter septatae; basidiosporae

Figs 1. **a.** Forest around Pico Carvalho base, approx. 1570 masl; **b-d.** Coltricia oboensis, basidiomata in situ (MUCL 54809, ST-11-56) (scale bar = 4 mm).

late ellipsoideae vel sub-oblongeae, flavo-brunneae, crassitunicatae, (6.5–) 6.8-9.0 (–9.5) × (4.5–) 5.0-6.0 (–6.5) µm (media 7.4 × 5.4 µm); ad basim arborum, inter muscos, in altitudinem nubes silva.

Basidiome seasonal, stipitate, pleuropodal; *stipe* lateral, filiform, faintly bulbous at the very base, 8-20 mm long × ≤ 1 mm diam., circular in section, coarsely hirsute, with free hairs, overall brown [7E(7-8)]; *pilei* dimidiate, plane to slightly convex, in one specimen faintly umbonate, projecting 3-6 mm, 5-8 mm wide (side to side), up to 3-3.5 mm thick; *pileus surface* shiny, cork-colored [4B4] to brown [7E(7-8)], coarsely hirsute or fibrillose, with stiff (erected), oblique to mostly prostrate hyphal bundles; *margin* abruptly bent down, fimbriate; *pore surface* grayish to grayish brown, slightly concave; *pores* irregular, rounded to elongate, daedaloid in some parts, entire, 2-3 per mm, 250-650 µm diam. (ave = 350 µm); *dissepiments* thick, entire when fresh, slightly lacerate on drying; *tubes* up to 3.5 mm deep, light brown [6D6, cinnamon] to brown [6E6], fibrous; *context* very thin to almost absent ≤ 100 µm thick, homogeneous, brown (6E8, 7D8), fibrous.

Hyphal system monomitic; *generative hyphae* simple-septate, little branched, thin- to variably thick-walled, the lumen widely open, hyaline first, soon yellowish to golden brownish, darker brownish in alkali, negative in Melzer's reagent; *in the context* hyphae mostly parallel to the surface, slightly interwoven, 4.0-6.5 µm diam.; *in the hymenophoral trama* hyphae slightly interwoven, (2.5–) 3.0-4.5 (–5.0) µm diam; *in the stipe* hyphae parallel to

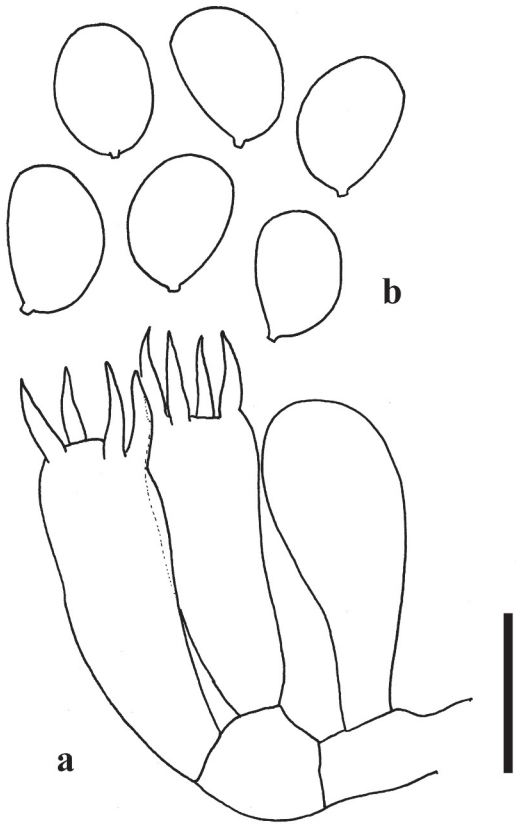

Fig. 2. Microscopic features of *Coltricia oboensis*, from holotype, MUCL 54810. **a.** basidia; **b.** basi-diospores (scale bar = 10 µm).

sub-parallel, 5.0-7.0 (–7.5) µm diam.; *pileus surface* with hyphae in erected to prostrate bundles, mostly parallel, thin- to slightly thick-walled, 4.0-5.5 µm diam; *stipe surface* trichodermial, with individual hyphae projecting 100-300 µm long, 5-8 µm diam., occasionally branched (bifurcated), ending rounded, brown, septate, very thick-walled, the wall sinuous on the internal side.

Hymenium: *cystidia* or other sterile hymenial elements absent; *basidioles* (immature basidia) shortly pedunculate to clavate, 15-18 × 6-8 µm; *basidia* shortly pedunculate to clavate, hyaline, simple septate, 15-22 × 6-9 µm, with 4 long sterigmata; *basidiospores* broadly ellipsoid to sub-oblong, pale yellowish brown, darker in alkali, negative in Melzer's reagent, thick-walled, smooth-walled, (6.5–) 6.8-9.0 (–9.5) × (4.5–) 5.0-6.0 (–6.5) µm (ave 7.4 × 5.4), Q = (1.2–) 1.26-1.5 (–1.55) (ave_Q = 1.37).

Ecology (substrate, host, habitat): basidiomes emerging among mosses, on dead stump or at the base of living tree, unidentified angiosperm, between 1570-1650 masl in mist/cloud forest.

Distribution: for the time being only known from high elevation forest in the *Parque Natural Ôbo de São Tomé*, São Tomé.

Holotype: São Tomé, *Parque Natural Ôbo de São Tomé*, between the *Pico Carvahlo* and *Mesa* base, approx. 00°15,719' N, 006°33,228' E, elev. approx. 1650 masl, among moss mats at the base of a living tree, unidentified angiosperm, 16-17 Apr. 2011, C. Decock, ST-11-56, in herbarium NY.

Additional specimen examined: São Tomé, *Parque Natural Ôbo de São Tomé*, very near the *Pico Carvahlo* base, along the main path to the *Mesa*, approx. 00°16.191' N, 006°34.586' E, elev. approx. 1570 masl, at the base of dead stump, unidentified angiosperm, among moss mats, 16-17 Apr. 2011, *C. Decock, ST-11-68*, in herbarium MUCL 54810.

Remarks. The minute, stipitate, pleuropodal basidiome, hirsute stipe, dimidiate, fibrillose and shiny pileus, bent down at the margin, irregular, rounded to angular pores, 2-3 / mm, and the broadly ellipsoid basidiospores, mostly 6.8-9.0 × 5.0-6.0 µm (ave 7.4 × 5.4 µm) are diagnostic for this species.

Other species with small basidiomes include *Coltricia minor* (Dai 2010) and *Coltricia indica* J.R. Sharma & J.E. Wright ex Baltazar (Baltazar *et al*. 2012, Sharma and Wright 1992). However, these two species have plane to infundibuliform, centrally depressed and thinner pileus, < 1-1.5 mm thick, with a thin, sharp margin. Their basidiospores are also mostly shorter than in *C. oboensis*, respectively 5.5-6.8 × 3.5-4 µm (Dai 2010) and 5-6.5 × 3-4.2 µm (Baltazar and Borges da Silveira 2012). *Coltriciella pusilla* (Imazeki & Kobayasi) Corner also has minute basidiomes but roughened basidiospores (Corner 1991, Dai and Li 2012).

DISCUSSION

Coltricioid fungi are distributed into two genera, *viz*. *Coltricia* and *Coltriciella*, which are distinguished by the basidiospore's external surface, respectively smooth or ornamented, variably verrucose (Ryvarden 2004). Their basidiomes are commonly found on wood, woody debris, or on the ground (Aime *et al.* 2003, Corner 1991, Ryvarden 2004) but the trophic relationships or nutritional strategy of most species are still incompletely known (e.g. Ryvarden 1991); a growing body of evidence suggests that Coltricioid species may form ectomycorrhizal associations with angiosperms (of which Caesalpiniaceae, Dipterocarpaceae, Phyllantaceae, and Myrtaceae) as well as gymnosperms (Pinaceae) (Bâ *et al.* 2012, Danielson 1984, Henkel *et al*. 2012, Thoen and Bâ 1989, Tedersoo *et al.* 2007a, b). Nevertheless, saprotrophism could not be excluded.

Coltricia oboensis is the first Coltricioid species reported from São Tomé. The basidiome of both collections was found emerging from moss mats, on a stump (*ST-11-68*, MUCL 54810) and at the base of a living tree (*ST-11-56*, NY). In both cases, the tree species was not identified. The nutritional status of this species remains unknown.

At elevation ≥ 1570 in the *Parque Natural Ôbo de São Tomé*, none of the dominant tree families is known to be ectomycorrhizal. In the near environment of the *Pico Carvalho* base (Fig. 1a), the tree composition is little diversified: the most frequent tree is the insular endemic *Tabernaemontana stenosiphon* Stapf. (Apocynaceae, "*cata d'obo*", possibly the main tree on Fig. 1a, F. de Oliveira [2011, 2013] and B. Loloum [2013], pers. com.). Apocynaceae are not known to be ectomycorrhizal (Bundrett 2009, Wang and Qiu 2006). Other tree species locally represented are mostly scattered and belong to Logoniaceae, Myrtaceae, Oleaceae, Podocarpaceae, Rubiaceae, Thymeleaceae, and Euphorbiaceae (F. de Oliveira [2013], pers. com.). None of these families but Myrtaceae is known to be ectomycorrhizal (Tedersoo 2007a, b). However, locally, Myrtaceae are represented only by *Sizygium guineense* Wall. that is not known to be ectomycorrhizal (Wubet *el al*. 2003).

More collections and accurate tracing and identification of the substrate and host plant would be very necessary to ascertain the nutritional strategy of this species.

Acknowledgements. The author warmly thanks the *Ministério de Plano e Desenvolvimento, Direcção de Agricultura e Pescas* of São Tomé for having granted permits; the guide at *Parque Natural Ôbo de São Tomé*, and Faustino de Oliveira, Director of the Botanical Garden at *Bom Sucesso*, for their help offered during the collecting trip; Mr. Bastien Loloum, Zuntabawé, who organized all the logistics of the collecting trip and helped in identifying the trees around *Pico Carvahlo*. Cony Decock gratefully acknowledges the financial support received from the Belgian State/Belgian Federal Science Policy (contract BCCM™) and the *Fonds de la Recherche Fondamentale Collective* (FRFC # 2.4515.06).

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