

**Studies on Basidiomycetes in Greece 1:
The genus *Crepidotus*****Z. GONOU-ZAGOU & P. DELIVORIAS**

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Abstract—The diversity of *Crepidotus* in the Eastern Mediterranean region is poorly known, and data from Greece are scarce. The present work aims at the record and study of the diversity of the genus in Greece and at the contribution to the knowledge of the distribution of the genus in Europe. Forty-four collections have been examined and ten taxa have been identified. *Crepidotus autochthonus*, *C. lundellii*, *C. luteolus*, *C. subverrucisporus* and *C. applanatus* var. *subglobiger* are newly recorded from Greece and most taxa are recorded on new substrates for both Greece and Europe. Detailed descriptions, ecological notes and taxonomical comments on all studied taxa are given.

Key words—lignicolous fungi, mycodiversity, biodiversity, taxonomy, *Crepidotaceae*

Introduction

Crepidotus is a distinct and well-defined genus, and although most species remain not yet completely documented and clarified, several monographic works, as well as critical revisions and regional studies based mainly on morphological studies, provide comprehensive systematic treatment of many species (Singer 1947; Pilát 1948; Hesler & Smith 1965; Singer 1973; Watling & Gregory 1989; Nordstein 1990; Stangl et al. 1991; Senn-Irlet 1995; Senn-Irlet & De Meijer 1998; Aime 2001; Krisai-Greilhuber et al. 2002; Bandala & Montoya 2002a, 2002b, 2004). The systematic position of *Crepidotus* was until very recently debatable, as it was placed either in family *Crepidotaceae* (Moser 1978; Jülich 1981; Singer 1986; Hawksworth et al. 1995), *Strophariaceae* (Kühner 1980) or *Cortinariaceae* (Bas 1988; Kirk et al. 2001). Recent phylogenetic analyses (Aime 1999; Moncalvo et al. 2002; Aime et al. 2005) allow to redefine the *Crepidotaceae* within a broader phylogenetic framework of the agarics, and the genera *Crepidotus* and *Simocybe* are better supported in family *Crepidotaceae* s.s., which represents a separate lineage of dark-spored euagarics.

In the Mediterranean region some studies on *Crepidotus* exist, mainly concerning N. Africa (Malençon & Bertault 1975), Spain (Ortega & Buendia 1989) and Italy (Lonati 2000). However, the knowledge of the diversity of *Crepidotus* in the Eastern Mediterranean region is poor, as few papers have been published and most of these are not easily accessible. The data from Greece are scarce. To date, only seven taxa were

recorded from Greece, usually without descriptions, and most collected very few times (Diapoulis 1939; Maire & Politis 1940; Avtzis & Diamandis 1988; Minter 1988; Diamandis & Perlerou 1990; Pantidou 1991; Diamandis 1992; Zervakis et al. 1998; Dimou et al. 2002a; Dimou et al. 2002b; Konstantinidis 2002; Polemis et al. 2002). Few papers from neighboring countries have been recently published, such as Croatia (Tkalčec & Mešić 2003) and Turkey (Öztürk et al. 2003; Ersel & Solak 2004; Sesli & Denchev 2005). Most of the above mentioned papers are floristic studies, lacking detailed descriptions or exsiccata.

The aim of the present study is to provide a better understanding of the biodiversity of the genus in Greece, concerning its morphology (including the range and importance of its variability), ecology and chorology. Collections have been made from various regions of central and southern continental Greece, mainly from coniferous and deciduous forests, as well as riparian and maquis vegetation.

The following ten taxa are identified and described in this work: *C. appianatus* var. *subglobiger*, *C. autochthonus*, *C. calolepis*, *C. cesatii* var. *cesatii*, *C. epibryus*, *C. lundellii*, *C. luteolus*, *C. mollis*, *C. subverrucisporus* and *C. variabilis*.

Materials and methods

Microscopical observations were made in bright field or phase contrast using a standard light transmission microscope. Sections of dried material were mounted in 3% KOH, with or without the addition of Phloxine. All measurements were made under 1000× magnification. At least 20 spores and 10 basidia and cheilocystidia were measured per specimen. The spores were measured from the surface of the pilei or from a spore deposit (when available). The spore sizes are given in approximation to 0.5 μm, with extreme values given in parentheses, followed by the length-width ratio of the spores (Q). Habitat references in the descriptions refer exclusively to the collected material. Greek localities are transcribed into latin according to ISO 843: 1997 (E). Authorities' abbreviations are in accordance to *Authors of Fungal Names* by Kirk & Ansell (1992). We have adopted the infrageneric classification proposed by Senn-Irlet (1995).

Material from other collectors or researchers (published or unpublished), was examined when available. The specimens collected from the authors are deposited in the Mycological Herbarium of the University of Athens (ATHU-M).

Taxonomic descriptions

Crepidotus (Fr.: Fr.) Staude 1857

Crepidotus subgenus *Crepidotus*

Crepidotus calolepis (Fr.) P. Karst.

Figs 1a–b; 9b, d; 11g

Crepidotus calolepis (Fr.) P. Karst., Bidr. Känn. Finl. Nat. Folk 32: 414 (1879); *Crepidotus mollis* var. *calolepis* (Fr.) Pilát, Ann. Hist. –Nat. Mus. Natl. Hung., n.s. 2B: 74 (1940); *Crepidotus mollis* ssp. *calolepis* (Fr.) Nordstein, Synopsis Fungorum (Oslo) 2: 67 (1990).

Pileus 10–70 mm, semicircular to flabelliform, convex to plano-convex, laterally or almost laterally attached to the substrate, with incurved and later even margin, surface viscid-sticky to dry, densely minutely tomentose-scaly with yellowish brown to brown

fibrillose scales on a dirty whitish, cream to ochre-yellowish background, consistency tough, elastic. **Lamellae** whitish in young specimens, then spotted brownish and finally uniformly ochre-brown to cinnamon, moderately crowded, emarginately adnate, margin minutely fimbriate, remaining whitish. **Stipe** absent or rudimentary. **Spore print** yellowish brown.

Basidiospores 7.5–11.0 × 5.5–7.0 μm, Q = 1.21–1.69, ellipsoid, amygdaliform in side view, smooth, yellowish brown in KOH, thick-walled, apex obtuse, depressed or occasionally mucronate; in some spores inner wall curving inwards at apex, resembling a callus or an indistinct germ pore when accompanied by a small apical depression (Figs 1a, 9b). **Basidia** 25–32 × 7–9 μm, cylindrical-clavate, 4-spored. **Cheilocystidia** 25–65 × 4–14 μm, clavate, cylindrical, irregularly cylindrical, somewhat fusiform to narrowly lageniform, sometimes branched, apex obtuse, often subcapitate (Fig. 1b), frequently embedded in gelatinous material entirely covering the lamellar edge. **Pleurocystidia** absent but pleurocystidioid-like bodies present in some specimens, clavate, with a short, apical or rarely lateral, finger-like protuberance (Fig. 11g). **Lamellar trama** often gelatinized. **Pileipellis** with an underlying layer of parallel hyphae, 3–5 μm wide, hyaline, not encrusted, and an upper layer of parallel to somewhat ascending hyphae, 4–12 μm wide, hyaline to pale ochraceous, with encrusting zebra-like pigment, amongst which ascending scale-forming hyphae, 4–15 μm wide, brown to dark brown, thin- to somewhat thick-walled, short-celled, with strongly encrusting, zebra-like pigment (Fig. 9d), in some specimens with markedly large, plate-like encrustations. **Pileal trama** partly gelatinized, gelatinous layer underlying the pileipellis usually distinct, up to 200 μm thick, but occasionally thin, rudimentary, and hence difficultly observed. **Secretory hyphae** occasionally present in pileipellis, pileal trama and lamellar trama, hyaline to golden yellow in KOH. **Clamp connections** absent in all tissues.

Habitat: Solitary to gregarious on standing or fallen trunks and branches of coniferous or deciduous trees.

Specimens examined — Mt. Taygetos, Messinia, on wood of *Platanus orientalis*, 29 Nov. 1968, Pantidou, ATHU–M 1071 (as *C. mollis*); Mt. Kandilio, Pagontas-Prokopi, Evvoia, forest of *Pinus* sp., on fallen branches of *Pinus* sp., 13 Dec. 1986, Gonou, ATHU–M 3781; Mt. Taygetos, Messinia, forest of *Pinus nigra* & *Abies cephalonica*, on fallen branches, 17 Nov. 1997, Gonou, ATHU–M 3782; Mt. Aroania, Zarouchla, Achaia, forest of *A. cephalonica*, on stump of *A. cephalonica*, 27 Nov. 1997, Delivorias, ATHU–M 3970; Mt. Parnitha, Attiki, forest of *A. cephalonica*, on fallen branches of *A. cephalonica*, 4 Dec. 1997, Gonou, ATHU–M 3783; Mt. Vardousia, Artotina, Fokida, forest of *P. nigra* & *Abies* sp., on fallen branches, 26 Sep. 1999, Gonou, ATHU–M 5107; Mt. Parnonas, Agios Petros, Arkadia, forest of *Castanea sativa* & *Quercus* sp., on fallen branches, 21 Nov. 1999, Gonou, ATHU–M 5105; river Agrafiotis, Epiniatia, Evrytania, riparian vegetation, on living trunk and branches of *Pl. orientalis*, 15 Oct. 2000, Delivorias, ATHU–M 5122; Gardiki, Fthiotida, forest of *Alnus glutinosa*, 15 Oct. 2000, Dimou, 731; Ano Chora, Nafpaktia, Aitolokarnania, dead trunk of *Pl. orientalis*, 22 Nov. 2001, Dimou, 988; Mt. Tymfristos, Agios Nikolaos, Evrytania, forest of *Pl. orientalis*, *Quercus* sp. & *C. sativa*, on trunk base of *Pl. orientalis*, 8 Nov. 2003, Gonou, ATHU–M 5108; Aetos, Messinia, on branches of *Pl. orientalis*, 6 Dec. 2003, Kapsanaki, ATHU–M 5111; Mt. Liakoura, Granitsa, Evrytania, forest of *Abies borisii-regis*, on fallen twigs of *A. borisii-regis*, 27 Sep. 2004, Delivorias, ATHU–M 5161; Mt. Liakoura, Limeri, Evrytania, forest of *P. nigra*, on

fallen branches of *P. nigra*, 13 Oct. 2004, Delivorias, ATHU-M 5174; Mt. Tymfristos, Agios Nikolaos, Evrytania, mixed forest of *Pl. orientalis*, *Quercus frainetto*, *C. sativa* and *A. borisii-regis*, on branches of *Pl. orientalis*, 23 Oct. 2004, Gonou, ATHU-M 5169; Mt. Liakoura, Granitsa, Evrytania, forest road, on living branches of *Pl. orientalis*, 11 Nov. 2004, Delivorias, ATHU-M 5175; Mt. Liakoura, Granitsa, Evrytania, forest of *A. borisii-regis* and *Pl. orientalis*, on fallen trunk of *Pl. orientalis*, 11 Nov. 2004, Delivorias, ATHU-M 5178.

Remarks: *C. calolepis* is very closely related to *C. mollis* and is considered by some authors as a variety or subspecies of the latter (Pilát 1948; Nordstein 1990). Others (Singer 1973; Watling & Gregory 1989; Senn-Irlet 1995, Bandala & Montoya 2004) consider the two taxa distinct at a specific level. Both species are characterized by the presence of a gelatinous layer in the pileal trama, considered to be more developed in *C. mollis* and less developed or absent in *C. calolepis*. This, however, has not been considered a reliable distinguishing feature (Nordstein 1990, Senn-Irlet 1995). We have accepted the species-concept of *C. calolepis* as portrayed by Senn-Irlet (1995), who has performed the most detailed work on the European species of the genus. According to this concept, *C. calolepis* is distinguished from *C. mollis* by the somewhat broader basidiospores and the presence of yellowish brown, fibrillose scales on the pileal surface formed by brownish hyphae with encrusting pigment. The pileal surface of *C. mollis* is glabrous or with scattered innate fibrils that may form indistinct pale scales, but the hyphae of the pileipellis are not pigmented and never heavily encrusted.

Our collections include specimens with strongly fibrillose-scaly pilei and specimens with almost or completely glabrous pilei, as well as many transitional forms. We cross-examined the morphology of the pileal surface, the structure of the pileipellis and the spore dimensions and concluded that two distinct forms exist amongst our collections. The first form is characterized by whitish pilei, glabrous throughout or with few fibrillose scales at the centre, in which the pileipellis consists of hyaline to pale yellowish hyphae with minute encrustations and the spores are consistently narrower (only exceptionally exceeding 6 µm in width and never more than 6.5 µm). The second form is characterized by yellowish to yellowish-brown, minutely to strongly fibrillose-scaly pilei, often throughout, in which the scale-forming hyphae of the pileipellis are consistently more or less strongly pigmented (yellowish brown to dark reddish brown in KOH) and in all cases heavily encrusted, and the spores are broader (most exceeding 6 µm and frequently reaching 7 µm in width). We identified the former as *C. mollis* and the latter as *C. calolepis*.

The Mediterranean variety *C. calolepis* var. *squamulosus* (Cout.) Senn-Irlet is not clear to us. It is reported by Senn-Irlet (1995) to have slightly larger basidiospores than var. *calolepis* (8.5–12 × 6–7.5 µm versus 7.5–10 × 5–7 µm) and broader scale-forming hyphae (up to 22 µm wide, instead of 14 µm wide). The spore-size in our specimens holds an intermediate position between the two varieties, as, in most collections, a significant portion of the spores exceed 10 µm in length, but we have not measured any spores larger than 11 µm in length or 7 µm in width. Also, we have not encountered any scale-forming hyphae broader than 15 µm. Although the spores in our specimens are slightly larger than those reported by Senn-Irlet, this has been reported by other authors as well (Bandala & Montoya 2004) and cannot be considered a significant enough deviance to justify a distinction at a variety level. We have therefore concluded

that all of our specimens must belong to a single taxon, i.e. var. *calolepis*. Lonati (1993) reports *C. mollis* var. *squamulosus* Cout. with a spore size of $7\text{--}10 \times 5\text{--}6$ (-6.5) μm and scale-forming hyphae $3\text{--}8$ μm wide. Judging on his description, Lonati's *C. mollis* var. *squamulosus* must in fact be *C. calolepis* var. *calolepis*. Malençon & Bertault (1975) also report having found *C. mollis* var. *squamulosus*, but they distinguish it from *C. calolepis* on the grounds that the latter represents a small-sized species with a non-gelatinized or little-gelatinized pileipellis, features that are not considered diagnostic (Nordstein 1990). They make no reference to the spore-size or the structure of the pileipellis. It is unclear to us whether their *C. mollis* var. *squamulosus* represents *C. calolepis* var. *calolepis* or var. *squamulosus*.

An interesting deviant feature in our examined collections is that many basidiospores present a curving of the inner wall at the spore apex, with the outer wall either remaining obtuse and thus giving the impression of a callus-like formation, or having a small depression, resembling an indistinct germ pore (Figs 1a, c; 9a–b). This was constantly observed in all examined specimens of both *C. mollis* and *C. calolepis* and should be considered characteristic for the two species. Singer (1973) also reports similar characteristics. Senn-Irlet (1995) refers that in SEM analyses, spores of *C. calolepis* and *C. mollis* reveal a small apical depression, which may be interpreted as an apical thinning of the wall, yet neither a truncate spore apex or an apical thinning was visible under the light microscope. When describing in general the spores of the genus, Singer (1986) reports that the spores may occasionally have an indistinct callus or rarely an indistinct germ pore.

In some specimens of *C. calolepis*, as well as *C. mollis*, the lamellar trama and margin are distinctly gelatinous, the gelatinous material often covering the lamellar edge entirely. The presence of this material is possibly related to environmental humidity.

Differentiated pleurocystidioid-like bodies were observed in the hymenium of some *C. calolepis* specimens, being more frequent near the margin. Singer (1986) reports that cystidioles may often be present on the sides of the lamellae in *Crepidotus* species and Hesler & Smith (1965) go as far as to acknowledge these elements as pleurocystidia. Senn-Irlet (1995) observed such bodies in *C. cesatii* and interpreted them as abnormalities induced by drought and therefore of no taxonomic significance. Apart from *C. calolepis*, we have also encountered such bodies in specimens of *C. subverrucisporus*. It is doubtful that these elements are of taxonomical significance in either case, as their presence is not constant and could not be correlated with any other deviant feature.

C. calolepis seems to be by far the most common representative of the genus in Greece, as we have collected it on several substrates from various locations. However, it was formerly recorded only by Maire & Politis (1940) on a stump of *Pinus halepensis* and dead trunks of *Platanus* sp., collections dating back to 1904 and 1906. On the other hand, the closely related *C. mollis* is recorded a number of times in the literature (Diapoulis 1939; Maire & Politis 1940; Pantidou 1991; Zervakis et al. 1998; Dimou et al. 2002a). We examined a collection of Pantidou (ATHU–M 1071), identified as *C. mollis*. It consists of a single, well-preserved specimen. The pileus is covered almost throughout with minute fibrillose scales and the scale-forming hyphae are yellowish brown to brown with strongly encrusting pigment. The spore dimensions fit accurately to our measurements of other specimens of *C. calolepis*. We have therefore concluded that this specimen formerly attributed to *C. mollis* in fact belongs to *C. calolepis* as here

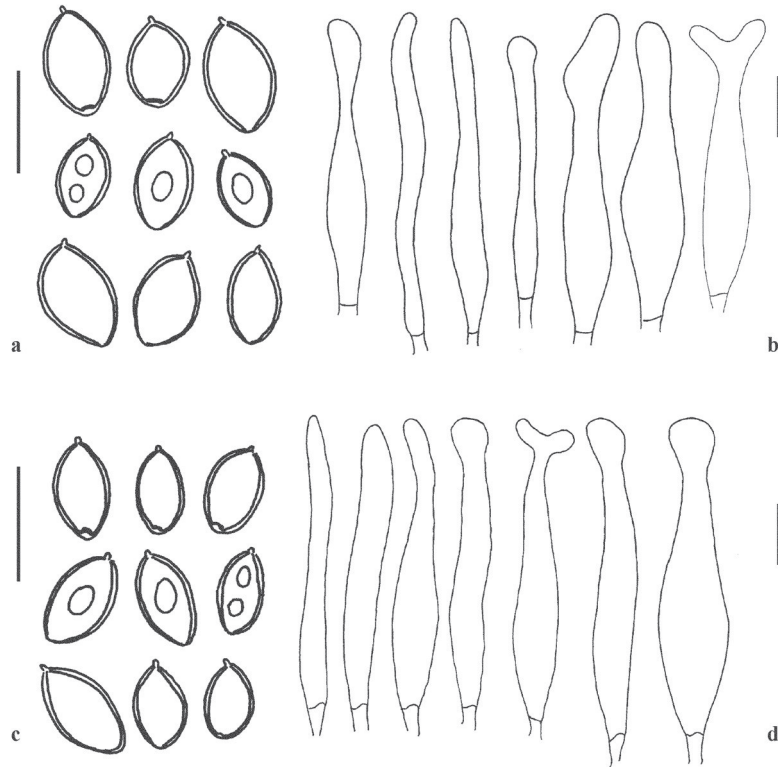


Fig. 1. a–b. *C. calolepis*: a. basidiospores, b. cheilocystidia, c–d. *C. mollis*: c. basidiospores, d. cheilocystidia. Scale bars = 10 μ m.

interpreted. We also examined three specimens collected by Dimou (pers. com.), two of which he had identified as *C. mollis* var. *calolepis* (731, 988, unpubl.), and one as *C. mollis* var. *mollis* (961, unpubl.), and we concur with his judgement. Typical forms of *C. mollis* and *C. calolepis* are easily distinguished from one another in the field, but we have encountered many non-typical specimens, transitional in appearance, that could easily be misidentified if not carefully examined under the microscope. The presence of fibrillose scales on the pileal surface can be variable in abundance, and specimens collected in wet weather often have apparently glabrous pilei, to the naked eye, as stressed by Bandala & Montoya (2004). It is our conviction that *C. calolepis* may have occasionally been mistaken for *C. mollis* in the past and is in fact much more common in Greece than the latter. Pilát (1948) states that *C. calolepis* is more common in dry areas or drier inland climates. This may explain the frequent occurrence of *C. calolepis* in Greece, a country with a drier climate in comparison to most European countries.

Most authors (Malençon & Bertault 1975, Ortega & Buendia 1989, Watling & Gregory 1989, Nordstein 1990, Senn-Irlet 1995, Breitenbach & Kränzlin 2000, Krisai-Greilhuber et al. 2002) report either or both *C. mollis* and *C. calolepis* solely on wood of broad-leaved trees. Scarce reports exist from wood of coniferous trees (Maire & Politis

1940, Bandala & Montoya 2004). In Greece, *C. calolepis* has been reported on a stump of *Pinus halepensis* (Maire & Politis 1940), now it is newly recorded on branches of *Abies cephalonica*, *Abies borisii-regis* and *Pinus nigra*. Of the material collected in this work, seven collections of *C. calolepis*, as well as two collections of *C. mollis*, were found on wood of coniferous trees (*Abies* and *Pinus*), which have not been recorded as substrates of either species in Europe. It has also been recently collected on branches of *Alnus glutinosa* (Dimou, pers. com.). Furthermore, eight collections of *C. calolepis* were found on wood of *Platanus orientalis*, a host also not included in the substrates of this species for Europe (Senn-Irlet 1995).

***Crepidotus mollis* (Schaeff.: Fr.) Staudé**

Figs 1c–d; 9a, c; 11b, d, k

Crepidotus mollis (Schaeff.: Fr.) Staudé, Schwämme Mitteldeutschl. 25: 71 (1857)

Pileus 10–50 mm, semicircular to flabelliform, convex to plano-convex, laterally or almost laterally attached to the substrate, with incurved and later even margin, surface viscid-sticky to dry, white to cream, glabrous to minutely fibrillose, forming scattered, indistinct fibrillose scales, more evident in dried specimens, consistency tough, elastic. **Lamellae** whitish in young specimens, then spotted brownish and finally uniformly ochre-brown to cinnamon, moderately crowded, emarginately adnate, margin minutely fimbriate, remaining whitish. **Stipe** absent or rudimentary.

Basidiospores 7.0–10.0 × 5.0–6.0 (–6.5) μm, Q = 1.42–1.82, ellipsoid, amygdaliform in side view, smooth, yellowish brown in KOH, thick-walled, usually with one and less often two large oil drops as well as few small ones, apex often mucronate and thin-walled, in some spores inner wall folding inwards resembling a callus or an indistinct germ pore (Figs 1c, 9a). **Basidia** 12–30 × 6–9 μm, cylindrical-clavate, 4-spored. **Cheilocystidia** 32–55 × 6–10 μm, irregularly cylindrical, lageniform to slightly fusiform, apex obtuse, sometimes subcapitate, rarely branched or septate, frequently embedded in gelatinous material entirely covering the lamellar edge (Fig. 1d, 11b). Basidioles, basidia and cheilocystidia rarely with golden-yellow, smooth content (Fig. 11d). **Lamellar trama** seldom gelatinized. **Pileipellis** with an underlying layer of parallel hyphae, 3–5 μm wide, hyaline, not encrusted, and an upper layer of hyaline to pale yellowish hyphae, 4–12 μm wide, with granular or minutely encrusting pigment but never heavily encrusted or strongly pigmented (Fig. 9c). **Pileal trama** partly gelatinized, gelatinous layer underlying the pileipellis, usually well-developed. **Secretory hyphae** occasionally present in pileipellis, pileal trama and lamellar trama (Fig. 11k), scarce to abundant, hyaline to golden yellow in KOH. **Clamp connections** absent in all tissues.

Habitat: Gregarious on living or dead trunks and branches of *Abies borisii-regis* and *Platanus orientalis*.

Specimens examined — Mt. Zygoourolivado, Pefkofyto, Karditsa, forest of *Abies borisii-regis*, on a fallen trunk of *A. borisii-regis*, 19 Sep. 1999, Delivorias, ATHU–M 5117; Mt. Zygoourolivado, Pefkofyto, Karditsa, forest of *A. borisii-regis*, on a fallen trunk of *A. borisii-regis*, 17 Nov. 2001, Delivorias, ATHU–M 5123; Tatoi, Attiki, on fallen twigs of a deciduous tree, Dimou, 961; Mt. Tymfristos, Agios Nikolaos, Evrytania, mixed forest of *Platanus orientalis*, *Quercus frainetto*, *Castanea sativa* and *A. borisii-regis*, on branches of *P. orientalis*, 23 Oct. 2004, Gonou, ATHU–M 5170; Mt. Liakoura, Granitsa, Evrytania, forest of *A. borisii-regis* and *P. orientalis*, on living trunk and branches of *P. orientalis*, 11 Nov. 2004, Delivorias, ATHU–M 5177; Mt. Liakoura, Granitsa, Evrytania, forest of *A.*

borisii-regis and *P. orientalis*, on dead branches of *P. orientalis*, 11 Nov. 2004, Delivorias, ATHU-M 5180.

Remarks: The aforementioned collections are those we have encountered to fit *C. mollis*. For further notes on *C. mollis* and comparison with *C. calolepis* see remarks under *C. calolepis*.

Secretory hyphae were observed in abundance in the lamellar trama of basidiocarps from collection ATHU-M 5123. However, in basidiocarps of ATHU-M 5117, collected two years earlier from the same trunk, these hyphae were scarce, and in specimen 961 collected by Dimou, no secretory hyphae were found. The presence of these hyphae is most likely due to environmental conditions or the stage of maturity of the basidiocarps, and is of little or no taxonomical merit. Similar secretory hyphae were also observed in some specimens of *C. calolepis*.

C. mollis is newly recorded for Greece on *Abies borisii-regis*. According to the substrate's list of the species in Europe (Senn-Irlet 1995), there is only one reference of the species from *Platanus* and none from conifers.

Crepidotus subgenus *Dochmiopus* (Pat.) Pilát, 1948

Section *Dochmiopus*

Crepidotus applanatus var. *subglobiger* Singer Figs 2a–d; 10h; 11h–j
Crepidotus applanatus var. *subglobiger* Singer, Nova Hedwigia Beih. 44: 478 (1973)

Pileus 5–30 mm, semicircular, flabelliform to petaloid, convex to plano-convex, laterally attached to the substrate, margin incurved to even, hygrophanous, translucently striate at margin when wet, surface smooth, somewhat felty at point of attachment, pure white to pale cream, becoming yellowish brown in dried specimens. **Lamellae** whitish in young specimens, then buff to snuff brown, moderately distant, adnate to decurrent, margin minutely fimbriate, remaining whitish (observed under lens). **Stipe** rudimentary, with white tomentum on the substrate.

Basidiospores (5.0–) 5.5–6.5 (–7.0) × (5.0–) 5.5–6.0 (7.0) μm, Q = 1.00–1.20, globose to subglobose, yellowish brown in KOH, with pinkish content, finely verrucose, with a perispore (Figs 2a, 10h). **Basidia** 18–26 × 6–8 μm, cylindrical-clavate, 4-spored, with basal clamp, content with numerous small oil drops. **Cheilocystidia** 45–110 × 5–12 μm, variable, typically cylindrical to narrowly lageniform, rather often subcapitate or curved at apex, some branched, some septate, in some cases with two septa on the same cystidium, hyaline, thin-walled but rather often thick-walled at the medial part, in some cystidia markedly so, up to 3 μm thick (Fig. 2b, d; 11h–j). **Pleurocystidia** absent but abundant pleurocystidioid-like bodies present, 14–22 × 5–6 μm, irregularly cylindrical to clavate, often curved, twisted or constricted, frequently with an apical to lateral, finger-like protuberance (Fig. 2c). **Pileipellis** a cutis, hyphae 4–8 μm wide, hyaline or with pale yellowish, diffuse to somewhat granular intracellular pigment, occasional hyphal ends exerting as pileocystidia, 30–70 × 6–9 μm, narrowly lageniform, cylindrical to subcapitate, hyaline. Secretory hyphae present in pileipellis, pileal trama and lamellar trama. **Clamp connections** present in all tissues.

Habitat: Scattered on a rotten fallen trunk of *Picea abies*.

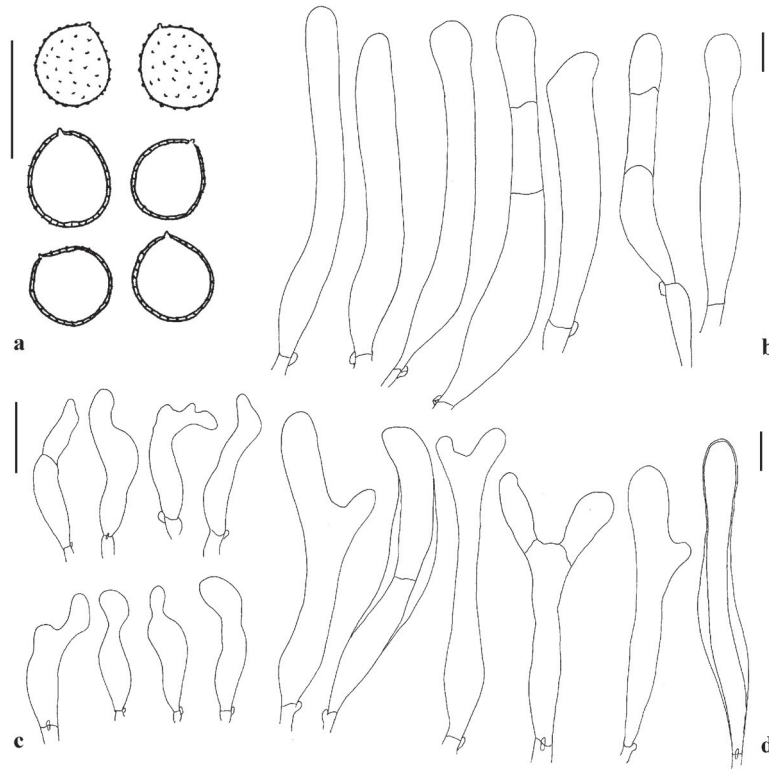


Fig. 2. *C. applanatus* var. *subglobiger*: a. basidiopores, b, d. cheilocystidia, c. pleurocystidoid bodies. Scale bars = 10 μ m.

Specimens examined — W. Rodopi Mts., Elatia, Drama, alt. 1550 m, on a fallen trunk of *Picea abies*, 5 Oct. 2005, Gonou & Floudas, ATHU-M 5332.

Remarks: *C. applanatus* var. *subglobiger* is distinguished from the typical variety by the shape of the cheilocystidia which are longer, narrowly lageniform to cylindrical instead of clavate to capitate. Furthermore, var. *applanatus* prefers hardwoods, whereas var. *subglobiger* seems to be restricted to coniferous wood.

We have collected this taxon only once, from a *Picea* forest in Northern Greece. Microscopic examination revealed a few deviant features, such as the presence of septa on many cystidia, and even, in many occasions, two septa on the same cystidium. This was not a constant feature however, as showed by examination of different lamellar margins from the same basidiocarp. In one lamella the cheilocystidia were almost predominately septate, whereas in a nearby lamella the septate cystidia were scarce to almost absent. Also, many cystidia with a markedly thick-walled medial part were encountered, with the remaining cystidium being thin- to slightly thick-walled. Finally, we observed many branched cystidia at the apices, either forked or laterally branched, in most cases with

two, rarely three, branches. It was surprisingly difficult to find basidia, although most specimens were fully mature, with abundant basidiospores in all preparations. We encountered instead many basidioles and pleurocystidioid bodies, these most probably being abnormally developed basidia. All the above mentioned abnormalities, if they be such, might be induced by environmental conditions.

Hesler & Smith (1965) described two varieties of *C. applanatus* based on the morphology of the cheilocystidia: var. *phragmocystidiosus* with septate cystidia and var. *diversus* with branched or knobbed cystidia. These varieties are considered conspecific by Aime (2001) with *C. applanatus* s. Joss. She concludes, after detailed examination, that cheilocystidia in this taxon are, under the influence of environmental conditions, capable of secondary growth that can alter their shape and size as well as the number of septa per cystidium. This, however, does not seem to be the case in our specimens, as the septate and non-septate cystidia are morphologically similar. We agree, nevertheless, with Aime's deduction that taxonomic delineation in *Crepidotus* cannot be based on cystidial morphology alone, as the form of the cheilocystidia may vary greatly within a single taxon and, as observed in this case, even within individual collections.

C. applanatus has been reported twice from Greece, from a fallen trunk of *Abies borisii-regis* (Diamandis & Perlerou 1990) and from dead branches of *Fagus* (Diamandis 1992). The latter collection is accompanied by a description, but with no reference to the morphology of the cheilocystidia. Judging by the habitat, the first collection might be var. *subglobiger* and the second var. *applanatus* but the authors make no such distinction.

C. applanatus var. *subglobiger* is newly recorded for Greece.

Crepidotus cesatii* var. *cesatii (Rabenh.) Sacc.

Figs 3a–b; 9e

Crepidotus cesatii (Rabenh.) Sacc., *Michelia* 1: 2 (1877); *Dochmiopus sphaerosporus* (Pat.) Pat., *Hyménomyc. Eur.*: 113 (1887); *Crepidotus sphaerosporus* (Pat.) J.E. Lange, *Dansk Bot. Ark.* 9 (6): 52 (1938); *Crepidotus cesatii* var. *sphaerosporus* (Pat.) A. Ortega & Buendía, *Int. J. Myc. Lich.* 4 (1–2): 96 (1989)

Pileus 3–22 mm, circular to semicircular or roundedly flabelliform, rarely somewhat lobed, convex to plano-convex, centrally to eccentrically or almost laterally attached to the substrate, margin incurved, becoming even only in fully mature specimens, surface dry, felty, pure white, remaining so in dried specimens or becoming pale cream. **Lamellae** whitish in young specimens, often with a pinkish tint, later cream, pinkish buff to pale cinnamon, never significantly darker, distant to subdistant, adnate, margin minutely fimbriate, remaining whitish. **Stipe** absent or rudimentary.

Basidiospores (5.5–) 6.5–8.0 (–9.0) × 4.5–7.0 μm, Q = (1.00–) 1.10–1.33 (–1.46), globose, subglobose to broadly ellipsoid, pale yellowish in KOH, finely echinulate (Figs 3a, 9e). **Basidia** 20–37 × 6–9 μm, cylindrical-clavate, 4-spored. **Cheilocystidia** 28–80 × 4–11 μm, diverticulate, clavate, cylindrical, irregularly cylindrical, fusiform, lageniform, usually branched, frequently multiply so, apices obtuse, hyaline, thin-walled (Fig. 3b). **Pileipellis** a trichodermium of loosely interwoven hyphae with transitions to a loose cutis, hyphae often coiled, 3–6 μm wide, hyaline, thin-walled. **Clamp connections** present in all tissues.

Habitat: Solitary or in small groups on dead or living branches of *Platanus orientalis* and, in one case, *Pinus nigra*.

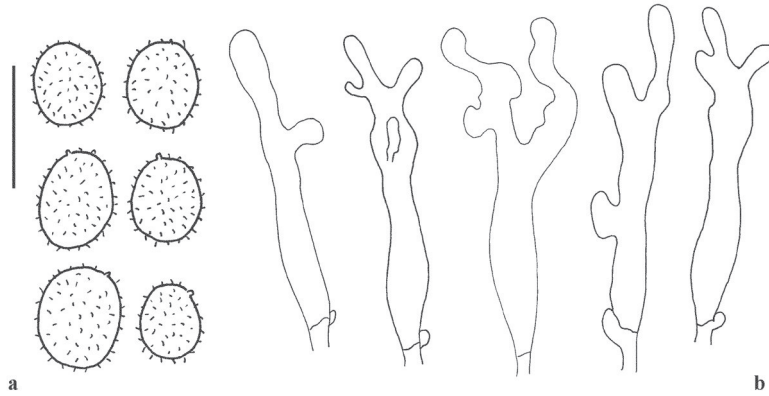


Fig. 3. *C. cesatii* var. *cesatii*: a. basidiospores, b. cheilocystidia. Scale bars = 10 μ m.

Specimens examined — Mt. Zygyroulivado, Anthochori, Karditsa, riparian vegetation, on a living branch of *Platanus orientalis*, 19 Sep. 1999, Delivorias, ATHU-M 5116; Mt. Katakloro, Kedros, Karditsa, riparian vegetation, on branches of *Pl. orientalis*, 13 Nov. 1999, Delivorias, ATHU-M 5118; Mt. Tymfristos, Raches Tymfristou, Evrytania, forest of *Pinus nigra* and *Abies borisii-regis*, on branches of *P. nigra*, 25 Oct. 2003, Delivorias, ATHU-M 5125; Mt. Tymfristos, Agios Nikolaos, Evrytania, forest of *Pl. orientalis*, *Quercus* sp. & *Castanea sativa*, on fallen twigs and branches of *Pl. orientalis*, 8 Nov. 2003, Gonou, ATHU-M 5109; Mt. Liakoura, Granitsa, Evrytania, forest of *A. borisii-regis* and *Pl. orientalis*, on dead twigs and branches of *Pl. orientalis*, 27 Sep. 2004, Delivorias, ATHU-M 5162; Mt. Tymfristos, Agios Nikolaos, Evrytania, mixed forest of *Pl. orientalis*, *Quercus frainetto*, *C. sativa* and *A. borisii-regis*, on branches of *Pl. orientalis*, 23 Oct. 2004, Gonou, ATHU-M 5173; Mt. Liakoura, Granitsa, Evrytania, forest road, on living branches of *Pl. orientalis*, 11 Nov. 2004, Delivorias, ATHU-M 5176; Mt. Liakoura, Granitsa, Evrytania, forest of *A. borisii-regis* and *Pl. orientalis*, on dead branches of *Pl. orientalis*, 11 Nov. 2004, Delivorias, ATHU-M 5179.

Remarks: The typical variety of *C. cesatii* is characterized by the distant lamellae, the globose to subglobose, finely echinulate basidiospores, the diverticulate cheilocystidia and the coiled hyphae of the pileipellis. The only other variety recognized by Senn-Irlet (1995), *C. cesatii* var. *subsphaerosporus* (J.E. Lange) Senn-Irlet, is reported to have broadly ellipsoid basidiospores, mostly straight hyphae on the pileipellis and to grow on branches of coniferous trees. Also, Watling & Gregory (1989), report that the latter variety lacks the characteristic pink tinge on the lamellae and has a darker spore print, although Senn-Irlet does not make such a reference. In all specimens examined in this work, at least a portion of the basidiospores were found to be broadly ellipsoid, and, in some specimens, these spores predominate. However, in all specimens the hyphae of the pileipellis were clearly coiled and the only collection made from coniferous trees does not seem to deviate microscopically from the remaining collections. As we have been unable to determine a correlation between the variation in shape of the basidiospores and either the structure of the pileipellis, the colour of the lamellae or the habitat, we have concluded that our findings consist of a single taxon, *C. cesatii* var. *cesatii*, in which

the basidiospores may range from perfectly globose to broadly ellipsoid in their extreme variation, with a Q ratio reaching up to 1.46.

C. cesatii var. *cesatii* is newly recorded for Greece on twigs and branches of *Pinus nigra* and *Platanus orientalis*, the latter seeming a rather common substrate for the species in Greece, in contrast to the references for the distribution of the species in Europe (Senn-Irlet 1995).

Crepidotus variabilis (Pers.: Fr.) P. Kumm.

Figs 4a–b, 10g

Crepidotus variabilis (Pers.: Fr.) P. Kumm., Führ. Pilzk.: 74 (1871)

Pileus 5–15 mm, circular to semicircular or roundedly flabelliform, often lobed, convex to plano-convex, centrally to eccentrically or almost laterally attached to the substrate, with incurved and later even margin, surface dry, felty to smooth, pure white to dirty white, remaining so in dried specimens. **Lamellae** whitish in young specimens, often with a pale pinkish tint, later clay buff and finally cinnamon brown, moderately crowded to crowded, emarginately adnate, margin minutely fimbriate, remaining whitish. **Stipe** absent or rudimentary.

Basidiospores (5.0–) 5.5–7.0 (–7.5) × (2.5–) 3.0–3.5 (–4.0) μm, Q = 1.57–2.17, short cylindrical to elongate, oblong, pale yellowish in KOH, minutely but distinctly punctate-warty (Figs 4a, 10g). **Basidia** 20–25 × 5–7 μm, cylindrical-clavate, 4-spored. **Cheilocystidia** 22–53 × 6–11 μm, diverticulate, clavate, cylindrical, irregularly cylindrical, fusiform, mostly branched, often multiply branched, hyaline, thin-walled (Fig. 4b). **Pileipellis** a trichodermium of loosely interwoven hyphae, 2–5 μm wide, hyaline, thin-walled. **Clamp connections** present in all tissues.

Habitat: Solitary to gregarious on branches of *Quercus frainetto*, *Quercus coccifera* and *Cistus* sp.

Specimens examined — lake Plastira, Agios Athanasios, Karditsa, forest of *Quercus frainetto*, on fallen branches of *Q. frainetto*, 1 Nov. 1998, Delivorias, ATHU–M 5112; lake Plastira, Agios Athanasios, Karditsa, forest of *Q. frainetto*, on fallen branches of *Q. frainetto*, 1 Nov. 1998, Delivorias, ATHU–M 5113; lake Plastira, Agios Athanasios, Karditsa, forest of *Q. frainetto*, on fallen branches of *Q. frainetto*, 18 Sep. 1999, Delivorias, ATHU–M 5114, Domokos, Fthiotida, maquis vegetation, on branches of *Quercus coccifera*, 13 Nov. 1999, Delivorias, ATHU–M 5115; Mt. Ymittos, Attiki, maquis vegetation, on twigs of *Cistus* sp., 7 Dec. 2002, Dimitriadis, ATHU–M 4648.

Remarks: *C. variabilis* is characterized by the lobed pileal margin (not always distinct, however), the small-sized, cylindrical, punctate-warty basidiospores and the diverticulate cheilocystidia. The lobed pileal margin may be a good distinctive feature for macroscopical identification when clearly formed, but, as in all white species of *Crepidotus*, careful microscopical examination is essential for identification. The characteristic small-sized, cylindrical basidiospores provide a reliable distinguishing feature. *C. variabilis* var. *trichocystis* Hesler & A.H. Sm. is reported to have larger basidiospores and longer, narrowly cylindrical to narrowly lageniform cheilocystidia (Senn-Irlet 1995).

C. variabilis seems to be common in Greece, as it is reported a number of times in the literature (Maire & Politis 1940, as *Dochmiopus variabilis*; Minter 1988; Avtzis & Diamandis 1988; Konstantinidis 2002) and we have collected it a few times ourselves.

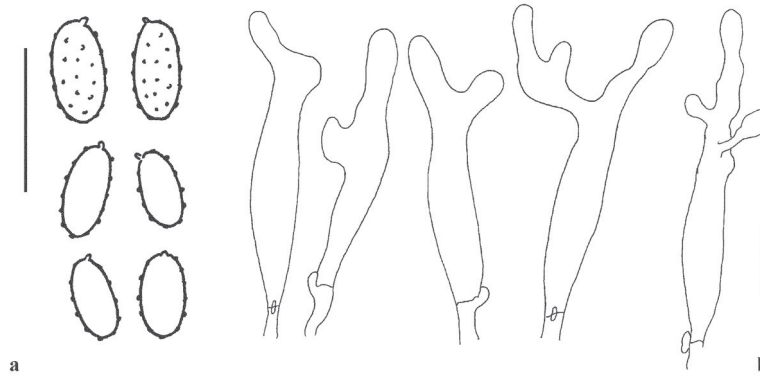


Fig. 4. *C. variabilis*: a. basidiospores, b. cheilocystidia. Scale bars = 10 μm .

It has also been recently collected on branches of *Alnus glutinosa* and *Quercus coccifera* (Dimou pers. com.). It is newly recorded for Greece on branches of *Quercus frainetto*, *Q. coccifera* and twigs of *Cistus* sp., the last two being representative plants of the maquis vegetation.

Section *Crepidotellae* Hesler & A.H. Sm., 1965

Subsection *Autochthoni* Senn-Irlet, 1995

Crepidotus autochthonus J.E. Lange

Figs 5a–b, 9f, 11c, e

Crepidotus autochthonus J.E. Lange, Dansk bot. Ark. 4 (6): 51 (1938)

Pileus 10–40 mm, semicircular to flabelliform, convex to plano-convex, laterally or almost laterally attached to the substrate, with incurved, later even to undulating margin, surface dry, glabrous to minutely fibrillose-tomentose, dirty whitish, cream to yellowish buff. **Lamellae** whitish in young specimens, then spotted brownish and finally uniformly cinnamon brown to fulvous, crowded, emarginately adnate, margin even. **Stipe** absent or rudimentary. **Spore print** yellowish brown to umber.

Basidiospores 7.0–9.0 \times 5.0–6.0 μm , $Q = 1.27$ –1.64, ellipsoid, amygdaliform or lemoniform in side view, with a more or less acute apex, smooth, thick-walled, occasionally wall thinning at acute apex, yellowish to yellowish brown in KOH, usually with a large oil drop (Figs 5a, 9f). **Basidia** 25–30 \times 7–9 μm , cylindrical-clavate, with 4 sterigmata. **Cheilocystidia** 17–32 \times 7–13 μm , cylindrical, clavate, some subcapitate, short lageniform, not branched, rarely septate, thin to thick-walled (Figs 5b, 11c). Basidioles and cheilocystidia sometimes with yellow-golden, smooth content (Fig. 11e). **Pileipellis** a cutis of hyaline hyphae, 3–5 μm wide, some ascending. **Pileal trama** without gelatinous layer. **Lamellar trama** with few secretory hyphae, usually hyaline, seldom golden-yellow. **Clamp connections** present in all tissues.

Habitat: Gregarious or in small groups on ground, in forest of *Quercus frainetto* or mixed *Q. frainetto* and *Abies borisii-regis*.

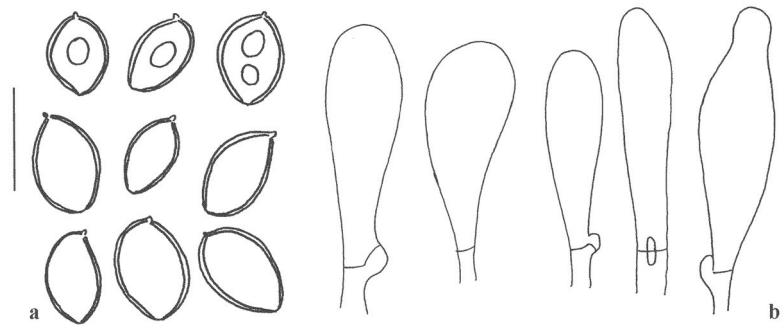


Fig. 5. *C. autochthonus*: a. basidiospores, b. cheilocystidia. Scale bars = 10 μm .

Specimens examined — Lake Plastira, Kryoneri, Karditsa, clearing of forest of *Quercus frainetto*, on ground, 14 Oct. 2000, Delivoria, ATHU-M 5121; lake Plastira, Kastania, Karditsa, mixed forest of *Q. frainetto* and *Abies borisii-regis*, on ground, 7 Sep. 2002, Delivoria, ATHU-M 5124.

Remarks: *C. autochthonus* is rather similar-looking macroscopically to *C. mollis* and has practically identical basidiospores, which nevertheless can be distinguished by their acute apex, without the characteristic wall curving or apical depression of *C. mollis* spores. It is also easily identifiable by the terrestrial habit, the lack of a gelatinous layer in the pileal trama, the shape of the cheilocystidia and the presence of clamp-connections. According to Senn-Irlet (1995), it is the only terrestrial species of *Crepidotus* in Europe.

C. autochthonus is newly recorded from Greece and is reported for the first time in Europe in forests of *Quercus* spp.

Subsection *Pleurotellus* (Fayod) Senn-Irlet, 1995

Crepidotus epibryus (Fr.: Fr.) Quél.

Figs 6a–b; 10i; 11f

Crepidotus epibryus (Fr.: Fr.) Quél., Mém. Soc. Emul. Montbéliard, sér. 2, 5: 138 (1872);

misdet.: *Crepidotus perpusillus* (Lumn.: Fr.) Maire, Fungi Catal. II: 102 (1937)

Pileus up to 10 mm, rounded flabelliform or campanulate when young, circular with age, spreading out on the substrate, becoming almost resupinate, with white tomentum around the margin where attached, sessile, surface tomentose, white, even when dried. **Lamellae** rather distant to moderately crowded, adnexed, whitish to pale ochraceous in fresh specimens, remaining so or darkening to fulvous in dried ones, margin concolorous, even to slightly uneven, often browning at places, especially when dried. **Flesh** very thin, white. **Stipe** absent.

Basidiospores 6.0–9.0 \times 2.5–3.0 μm , cylindrical, somewhat fusoid to narrowly amygdaliform or pip-shaped, some slightly curved, smooth, hyaline or pale yellow in KOH, yellow in the commonly formed masses (of two, four or more) (Figs 6a, 10i). **Basidia** 15–20 \times 5–6 μm , clavate, 4-spored, usually hyaline; some disintegrating basidioles and