

## **Mycodiversity studies in selected ecosystems of Greece: IV. Macrofungi from *Abies cephalonica* forests and other intermixed tree species (Oxya Mt., central Greece)**

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**Abstract** — In the course of a nine-year inventory in Mt. Oxya (central Greece) fir forests, a total of 358 taxa of macromycetes, belonging in 149 genera, have been recorded. Ninety eight taxa constitute new records, and five of them are first reports for the respective genera (*Athelopsis*, *Crustoderma*, *Lentaria*, *Protodontia*, *Urnula*). One hundred and one records for habitat/host/substrate are new for Greece, while some of these associations are reported for the first time in literature.

**Key words** — biodiversity, macromycetes, fir, Mediterranean region, mushrooms

### **Introduction**

The mycobiota of Greece was until recently poorly investigated since very few mycologists were active in the fields of fungal biodiversity, taxonomy and systematic. Until the end of '90s, less than 1.000 species of macromycetes occurring in Greece had been reported by Greek and foreign researchers. Practically no collaboration existed between the scientific community and the rather few amateurs, who were active in this domain, and thus useful information that could be accumulated remained unexploited. Until then, published data were fragmentary in spatial, temporal and ecological terms. The authors introduced a different concept in their methodology, which was based on a long-term investigation of selected ecosystems and monitoring-inventorying of macrofungi throughout the year and for a period of usually 5-8 years. The first integrated results have been already published in previous papers (Dimou et al. 2000, 2002, Zervakis et al. 2002a, 2002b). The data presented in this paper were accumulated during the period 1996-2004.

Oxya Mt. lies in the middle of the continental region of Sterea Hellas and forms the natural limit between the administrative prefectures of Fthiotida, Evrytania and Aitoloakarnania. More details about this mountain (map, forests distribution, edaphic and climatic conditions) have been

presented in the first part of this study concerning the mycobiota of the beech forest (Dimou et al. 2002).

The data presented in this work derive from research on the biodiversity of macromycetes occurring in the fir forests growing on the eastern slope of the Oxya Mt. The vegetation there presents a characteristic zonation of different forest types: the alpine zone is succeeded either by the beech forest (in the central region of this part of the mountain) or directly by *Abies cephalonica* Mill. forests (in the northern and southern regions), which in turn are succeeded by deciduous oak forests (*Quercus pubescens* Willd., *Q. frainetto* Ten. and *Q. petraea* (Matt.) Liebl. ssp. *petraea*) located in lower altitudes. The *Abies* zone lies between altitudes of 840 to 1300 m a.s.l. Isolated stands of fir trees (not investigated) occur also within the beech forest (i.e. 1400 to 1600 m a.s.l.). Within the northern and southern regions of the eastern slope of the Oxya Mt., *A. cephalonica* is intermixed mainly with *Castanea sativa*, *Quercus* spp., while compact *Pinus nigra* stands were established by reforestation in two positions of this zone. Other tree species, scattered within the fir forest, are *Acer pseudoplatanus* L., *Platanus orientalis* L., *Prunus cocomilia* Ten., *Carpinus orientalis* Mill., *Populus* spp., *Cornus* sp., *Salix* spp., *Juniperus* spp. (forming distinct plant communities in some positions), *Ostrya carpinifolia* Scop., *Alnus glutinosa* (L.) Gaertner and *Robinia pseudoacacia* L.

This work is a complete list including all macromycete species recorded by the authors in the *A. cephalonica* forest of the Oxya Mt. and in the adjacent alpine zone. Only a few taxa have been included in the two published checklists of the Greek macrofungi (Zervakis et al. 1998, 1999).

### Methodology

The recording process was carried out in various localities of the *Abies* zone in Oxya Mt., but three areas were systematically investigated:

Area 1 (A1); in the vicinity of the Gardiki village: site 1 (S1): altitude 840-950 m a.s.l., dominant vegetation consisting of *Abies cephalonica* intermixed in some localities with *Castanea sativa*, *Alnus glutinosa*, *Platanus orientalis*, *Robinia pseudoacacia* and *Pinus nigra*; site 2 (S2): 1,000-1,150 m a.s.l., mainly *A. cephalonica* intermixed sporadically with *Castanea sativa*; site 3 (S3): 1250-1380 m a.s.l., *A. cephalonica* and *Juniperus occidentalis* intermixed or present in small communities next to the alpine zone; site 4 (S4): 1,450-1,700 m a.s.l., consisting of the adjacent alpine zone; site 5 (S5): 850-950 m a.s.l., occupied by reforested *P. nigra*, intermixed mainly with naturally grown *R. pseudoacacia*, but also by *A. cephalonica*, *J. oxycedrus*, *Quercus* spp. and *C. sativa*.

Area 2 (A2): on the limit between *Fagus-Abies* forests, 1300-1350 m a.s.l., along the road connecting the villages of Gardiki and Grammeni Oxya (38°47'45''N 21°58'18''E).

Area 3 (A3): near the Grammeni Oxya village, 1100-1300 m a.s.l. (*A. cephalonica* pure and intermixed with *Quercus* spp., *Pinus nigra* and *C. sativa*).

Field parameters, macroscopic characteristics and some macro-chemical reactions of the collected specimens were recorded in situ. Microscopic observations and micro-chemical reactions were carried out in the Laboratory of General & Agricultural Microbiology at the Agricultural University of Athens (LGAM-AUA). When needed, additional examinations were performed at the Institute of Environmental Biotechnology in Kalamata (National Agricultural Research Foundation).

Ascomycetes and Basidiomycetes are presented in separated sections, and within each group, the species are listed in alphabetical order. Nomenclature follows the guidelines of the latest edition of the Dictionary of Fungi (Kirk et al. 2001). Under each fungus name, information on the exact collection site, the host/substrate and the date of the record is given. In addition, data on macroscopic and microscopic features, together with pertinent comments, are presented for those records, which are new for Greece. Taxa reported for the first time in Greece are marked by an asterisk (\*), while records new for Greece as concerns habitat or host/substrate are marked by a cross (†). All the species cited in this study are deposited in the herbarium of LGAM-AUA. A photographic archive is also maintained, and pure cultures are available for certain fungi.

The Greek geographical names are those used in modern Greek (“dimotiki”) that are transliterated following the international standard ISO 843 (1999). For specimens identification and classification the following references were mainly used: Bas et al. (1988-95), Bigelow (1982, 1985), Bon (1991), Breitenbach & Kränzlin (1984-2000), Brandrud et al. (1989-98), Eriksson and Ryvarden (1973-76), Eriksson et al. (1978-88, Hansen & Knudsen (1997-2000), Hjortstam et al. (1987, 1988), Jacquetant (1984), Jülich (1984), Kõljalg (1996), Kuyper (1986), Martin (1996), Montecchi & Sarasini (2000), Moser (1983), Nauta (1987), Noordeloos et al. (2001), Ryvarden & Gilbertson (1993), Sarnari (1998).

#### **Data recorded**

##### ***Ascomycetes***

† *Ciboria rufofusca* (O. Weberb.) Sacc.

Recorded in early May 2003, on *Abies cephalonica* cone scales (A1S2). Only one previous record on *Abies borisii-regis* cone scales (Perlerou & Diamandis 2000); probably not so rare but often overlooked.

†*Gyromitra gigas* (Krombh.) Cooke

Recorded in April 1999 and 2000, and in May 2003 under *Abies* (A1S2). Only one report in the past from the *Fagus* forest of this mountain (Dimou et al. 2002), but it has also been found in other regions of Greece (G. Constantinidis, personal communication).

†*Helvella acetabulum* (L.) Quél.

Collected once in May 2001 under *Abies*. Recorded previously in *Pinus nigra* (Diamandis 1985), *Castanea sativa* (Diamandis 1992) and *Quercus* spp. (Constantinidis 1994, Zervakis et al. 2002b).

\**Lachnellula gallica* (P. Karst. & Har.) Dennis

On dead branches and twigs of *Abies* in April 2000 and 2002 (A1S2). Apothecia short stipitate 1.5-2 mm in diameter, outside white hairy, hymenium orange; spores ellipsoid 7-10 x 4.5-6 µm, asci 60-80 µm long (Hansen & Knudsen 2000 report 70-105 x 6.5-8.5 µm) The similar looking *L. subtilissima* (Cooke) Dennis has slender spores 6-9 x 2-2.5 µm and asci 45-60 long (op. cit.).

*Lanzia echinophila* (Bull.) Korf

Recorded on the inner surface of empty *Castanea sativa* cups in October 2000 (A1S1). Only one previous report (Minter 1988) as *Rutstroemia echinophila* (Bull.) Höhn. on *C. sativa* and *Quercus ithaburensis* var. *macrolepis* cups (Minter 1988).

\**Morchella costata* (Vent.) Pers. f. *acuminata* Jacquetant

This species is characterized by the pale ochre- to pinkish-brown, lance-shaped pileus, the parallel longitudinal ribs (thin and blackening in the maturity), primary alveoli few, secondary alveoli rectilinear, rectangular and bottom-flattened. Collected in May 2002 under mixed *Abies-Platanus-Alnus* trees (A1S1), and in May 2004 under mixed *Abies-Castanea* trees (A1S2).

†*Morchella elata* Fr.

Recorded in May 2001 under mixed *Abies-Castanea* trees (A1S2). Characterized by the olive-brown to black-brown pileus bearing longitudinally parallel ribs connected by cross-ribs (forming primary and secondary alveoli in rows), and by the margin of pileus which sharply bents to attach to the stipe.

\**Morchella eximia* Boud. f. *schizocostata* Jacquetant

In this species, pileus is cream- to ocher-brownish colored, rounded to conical but with obtuse apex, longitudinal ribs thick, blackening in old specimens and running usually from the top to the base of the pileus, sometimes torn irregularly, cross-ribs abundant and irregular but sometimes lacking between two longitudinal ribs on the whole pileus length, alveoli somewhat irregular and deep; stipe white- to beige-ochraceous, base slightly tapering or widening often wrinkled. Collected in April 2000 and in May 2001 from the same location (A1S2) under mixed *Abies-Castanea* trees, among herbs.

\****Morchella intermedia*** Boud.

This taxon differs from *M. elata* in forming smaller fruit-bodies, fewer cross-ribs, and in possessing irregular alveoli arrangement (Jacquetant 1984). Collected in April 2000 in an *Abies* clearing (A1S2).

***Otidea bufonia*** (Pers.) Boud.

Recorded only once in November 1996 (A1S3) (Zervakis et al. 1999). This is the only record in *Abies cephalonica* for Greece.

†***Poculum firmum*** (Pers.) Dumont

Collected at the end of November 2003 on a twig of *Platanus orientalis* (A1S1). One previous report as *Rutstroemia firma* (Pers.) P. Karst. on *Castanea sativa* (Minter 1988).

***Sowerbyella imperialis*** (Peck) Korf

Rare species, collected once in December 1999 under *Abies* (A1S2). Reported twice in the past from *Abies* forests (Diamandis 1992, Diamandis & Perlerou 1994).

\****Tuber uncinatum*** Chatin

One fruitbody found in early May 2003, just after snow melting, under *Abies* between areas A1 and A2 at 1,160 m a.s.l., on damp soil with many surface and subsurface galleries created by rodents and it was apparently dug out by them. It resembles *T. aestivum* Vittad., but it differs macroscopically (smaller warts of the surface), microscopically (spores with long and uncinuate papillae on the cross-sections of the reticulum), ecologically (species growing on higher altitudes, ascomata developing during late autumn-early winter) and in producing different protein-profile (Delmas 1989). Montecchi & Sarasini (2000) consider this taxon as a form of *T. aestivum* (*T. aestivum* f. *uncinatum* Montecchi & Borelli). Three *Tuber* species have been reported in the past from Greece, viz: *Tuber melanosporum* Vittad. (Landerer 1854, as *T. cinereus*), *T. genadii* (Chatin) Pat. (Genadios 1914), and *T. aestivum* (Pantidou 1973) but only for the latter a herbarium specimen exists.

\****Urnula pouchetii*** Berthet & Rioussset

Ascomata urniform, 1.7-2.8 cm in diameter with a small hole at the bottom of apothecium and margin serrated or odontoid; stipe tapering to the base, often with rhizoids; hymenium dark grey-brown to violet-brown, outer surface whitish to pale grey-brown; spores 18-24 x 7-10 µm. *U. craterium* has a similar shape but the outer surface is dark brown, the spores are much bigger and the apothecium structure is different in cross-section. This fungus is reported to be rare and we found it for the first time in early May 2003 imbedded into mossy stands, under *Abies* (A1S2). It has also been found in the past (G. Constantinidis, personal communication), but only in the neighboring Tymfristos Mt. (Evrytania). Probably overlooked since the fruitbodies are buried into mosses, revealing only the apothecia openings.

***Vibrissea truncorum*** (Alb. & Schwein.) Fr.

Rare species recorded only once in May 1992 (A1S3) on piece of wood in stream (Zervakis et al. 1999).

†***Xylaria hypoxylon*** (L.) Grev.

On decaying wood of *Abies* (October 1998) and *Platanus orientalis* (March 2000) (A1S1). Rare on conifers.

Other common in Greece ascomycetes recorded in this area (all on or under *Abies*):

***Caloscypha fulgens*** (Pers.) Boud., April-May (A1S3), ***Discina perlata*** (Fr.) Fr., April-May (A1S1, A1S3), ***Geopora sumneriana*** (Cooke) M. Torre, April-May (A1S1, A2), ***Gyromitra esculenta*** (Pers.) Fr., April-May (A1S3), ***Gyromitra infula*** (Schaeff.) Quél., (A1S3), ***Helvella lacunosa*** Afzel., October-November everywhere, ***Pithya vulgaris*** Fuckel, March-April (A1S2).

### ***Basidiomycetes***

\****Agaricus impudicus*** (Rea) Pilát

One collection in October 2000 on soil with grasses, under a *Juglans regia* tree in the Gardiki village (A1S2). The spore dimensions [5-7.5 (-8) x 3.5-4.2 (4.5) µm] of our collection were broader than those cited in most literature sources. Bon (1979) distinguished *A. koelerionensis* (Bon) Bon based on the larger spores, but Noordeloos et al. (2001) consider it as a synonym, since they examined collections with spore size range, including the size found in our specimens.

\****Agaricus langei*** (F.H. Møller) F.H. Møller

Collected in October 2000 in a *Castanea* orchard (A1S1). This collection was characterized by the strongly reddening flesh and the large spores (6.5-9 x 3.7-4.8 µm). Hansen and Knudsen (1992) consider *A. haemorrhoidarius* Schulz. ss. Lange, Schäffer, Pilát to be a synonym. Pantidou (1973, 1990) has reported *A. haemorrhoidarius* Schulz. from *Quercus* sp. but she quoted spore dimensions of 4.5-6 x 3-3.5 µm that fit *A. haemorrhoidarius* Schulz. ss. Møller that is considered as synonym of *A. silvaticus* Schaeff. var. *silvaticus* (Hansen & Knudsen 1992, Noordeloos et al. 2001).

†***Agaricus pampeanus*** Speg.

Recorded in clearings of the *Abies* forest (October 1999, A3), but also on needle litter (October 2000, A1S2). This fungus has been recorded for the first time in the alpine pastures over the *Fagus* forest of the Oxya Mt. (Dimou et al. 2002), but it seems to be quite common in Greece (Dimou-Polemis unpublished data, G. Constantinidis personal communication).

†*Agaricus porphyrizon* P.D. Orton

Collected once under *Abies* in October 1998 (A1S2). This species was recorded twice previously under *Cupressus sempervirens* (Polemis 1998) and *Quercus frainetto* (Zervakis et al. 2002b).

\**Agrocybe pediades* (Fr.) Fayod f. *cinctula* Nauta

Collected in May 2001 from a grassy clearing in the *Abies* forest (A1S2). Pileus convex to plano-convex 1.6-2.1 cm in diameter, yellow-cream to ocher with a beige network, smooth; lamellae beige to pale brown, finally brown; stipe cylindrical 2.8-4.0 x 0.2-0.3 cm concolorous to the pileus, with rudimentary annular zone, longitudinally fibrillose, base with rhizomorphs; spores ellipsoid (12-)13-19(-21) x 9-12(-14) x 8.5-10.5 µm, thick-walled with germ-pore; basidia 30-40 x 8-10 µm, 1-2-spored with broad conical sterigmata; cheilocystidia lageniform-lecythiform 25-35 x 7-11 µm, pleurocystidia not seen. This collection was assigned to the subgenus *Agrocybe*, section *Pediadeae* (Singer 1986), but (to our best of our knowledge) none of the species it includes possesses spores exceeding 18.6 µm. We consider it to be closer to the form described by Nauta (1987) because of the 2-spored basidia and the absence of pleurocystidia (in this very variable form 4-spored basidia as well as specimens possessing pleurocystidia have been also reported).

†*Agrocybe praecox* (Pers.) Fayod

Two collections in May 2002; one from an area (A1S3) characterized mainly by *Juniperus oxycedrus* with interspersed *Abies* trees, and one under mixed *Quercus pubescens* and *Abies cephalonica* trees (area between A1 and A2). Only two previous records, from the *Fagus* wood of the same mountain (Dimou et al. 2002) and from *Quercus* woods in Peloponnisos (Zervakis et al. 2002b).

†*Albatrellus cristatus* (Schaeff.) Kotl. & Pouzar

Recorded only twice (October 1997, August 2002) under *Abies* (A1S2). Few reports, a rather rare species.

†*Amanita battarae* (Boud.) Bon

In mixed *Abies-Quercus* forest, in September 1999 (A3) and under *Abies*, among ferns and herbs in August 2002 (A2). Very similar to *A. submembranacea* (Bon) Gröger (recorded in the *Fagus* forest of this mountain, Dimou et al. 2002), but without veil remnants on the pileus. Reported once previously (Gonou-Zagou 2000).

†*Amanita excelsa* (Fr.) Bertill.

Collected at the end of May 2002 under mixed *Abies-Quercus* trees (between A1 and A2), and at the end of August 2002 under *Abies* (A1S2). *A. excelsa* is considered by some authors as a synonym of *A. spissa* (Fr.) P. Kumm., but it differs in having a bald stipe below the ring and a bulbous base. One previous record under mixed *Quercus* spp.-*Carpinus betulus* trees (Zervakis et al. 2002b).

***Amanita franchetii*** (Boud.) Fayod

This collection, made at the end of August 2002 under *Abies* (A1S2), represents the yellow form of this species (pileus yellowish-cream with concolorous patches). Collected in the past from the beech forest of this mountain (Dimou et al. 2002), from the conifers of Taygetos Mt. (Zervakis et al. 2002a) and from the *Quercus* forests of Peloponnisos (Zervakis et al. 2002b).

†***Amanita fulva*** (Schaeff.) Fr.

Collected once at the end of August 2002 in an *Abies* forest clearing (A1S2). Two previous records in *Castanea* forests (Maire & Politis 1940, Perlerou & Diamandis 2000).

***Amanita gemmata*** (Fr.) Bertill.

Recorded once in May 2001 on the margin of an *Abies* forest clearing (A1S2). Only two previous reports (Gonou-Zagou 2000, Zervakis et al. 2002a).

\****Amanita spissa*** (Fr.) P. Kumm.

Collected in September 1999 and in August 2002 under *Abies* (A2, A2S2). Very similar to *A. excelsa*, it differs in having a belted-squamulose stipe below the annulus, a deeply rooting not-bulbose base (volva remnants remaining in the soil), and patches on the pileus which are firmly attached.

†***Amanita virosa*** (Fr.) Bertillon

Collected once in October 1998 in a *Castanea sativa* orchard (A1S1). Not common in Greece, reported from coniferous and broadleaved woods.

†***Amylostereum chailletii*** (Pers.) Boidin

This collection, made in March 2000 from a fallen *Abies* trunk (between A1 and A2), comprised of young basidiomata fully resupinate on horizontal surface, not having the typical colors but a cream-beige color with a pink tint. Spores few, 6-8 x 2.5-3.5 µm, I<sup>+</sup>, hyphal system dimitic. Only one previous report on *Abies borisii-regis* (Kailidis & Markalas 1981).

†***Amylostereum laevigatum*** (Fr.) Boidin

Recorded twice during April 1999 on a cross-section of an *Abies* trunk (A1S3) and on the bark of a dead *Abies* stump (A1S2). Basidiomata resupinate, hymenium cream-ocher with a faint pink tint, spores 7-10 x 3-4 µm, I<sup>+</sup>, hyphal system monomitic. It differs microscopically from the previous in spore size and the hyphal system. Not known up to now on *Abies* in the literature. From Greece only one previous report on *Juniperus* sp. (Minter 1988).

\****Antrodia juniperina*** (Murrill) Niemelä & Ryvar den

Collected in April 1999 and in May 2003 from *Abies* logs (A1S2) causing brown cubical rot. Basidioma resupinate on horizontal surfaces, effused-reflexed to semipileate on vertical ones, up to 13 cm wide. Pileoli projecting up to 1 cm, upper surface brownish, pores whitish 1-1.5 mm wide, angular in horizontal position, deep, irregularly split, sinuous to daedaloid (up to 3 mm



distant) in vertical positions; spores 5-7.5 x 2-2.5 (-3)  $\mu\text{m}$ , cylindrical to subfusoid. This species, very rare in Europe but widespread in South Africa and USA, is known up to now only on *Juniperus* spp. (Jülich 1984, Ryvarden & Gilbertson 1993).

***Antrodiella semisupina*** (Berk. & M.A. Curtis) Ryvarden

One collection in April 1999 (A1S5) from fallen *Quercus* branch (Dimou et al. 2000). Basidioma resupinate to pileate, pilei imbricate projecting up to 3.5 cm, upper surface whitish; pore surface whitish, 6-9 pores/mm; hyphal system trimitic, generative hyphae clamped, spores ellipsoid up to 4 x 2.5  $\mu\text{m}$ . This is the only record in Greece.

***Armillaria tabescens*** (Scop.) Emel.

Recorded at the end of August 2002, in clusters around almost every stump and living tree of a *Quercus*-stand (A1S5). Two previous reports (Tsopelas 1999, Zervakis et al. 2002b).

†***Astraeus hygrometricus*** (Pers.) Morgan

Collected in April 2001 in an *Abies* wood clearing (A1S3), and at the end of November 2003 among *Juniperus oxycedrus* stands (A1S5). A common fungus in Greece occurring from the sea level up to the mountainous regions.

†***Athelia decipiens*** (Höhn. & Litsch.) J. Erikss.

This collection, made in March 2001 (A1S5) from a *Quercus pubescens* stump, was characterized by the ellipsoid spores measuring 4.5-5.5 x 2.5-3  $\mu\text{m}$  (often glued in groups of four) and the very rare clamps present only on the basal hyphae. In literature, it is mostly reported as completely lacking clamps, but Eriksson & Ryvarden (1973) have reported the presence of scarce clamps on specimens they examined. Rare on hardwoods. One previous record on *Pinus nigra* (Zervakis et al. 2002a).

\****Athelopsis subinconspicua*** (Litsch.) Jülich

This fungus is characterized by the thin, pellicular fruit-bodies of yellowish color with a greenish tint. Spores 6.5-8 x 4-5  $\mu\text{m}$  (in the literature spores are slightly narrower, up to 4.5  $\mu\text{m}$ ), basidia stipitate, septa with clamps. It was collected in early spring (March 2000) from the inside surface of the bark of an *Abies cephalonica* stump (A2).

†***Bolbitius titubans*** (Bull.) Fr.

Collected at the end of May 2002 among grasses, on soil rich in sheep dung, around a sheepfold in the alpine zone. The spores of this collection measured up to 17 x 11  $\mu\text{m}$ , bigger than those reported in literature (up to 15 x 9  $\mu\text{m}$ ). Some previous reports from Greece as *B. vitellinus* (Pers.) Fr.

\****Boletus fechtneri*** Velen.

Collected at the end of August 2002, growing solitary under mixed *Abies-Quercus* trees (A3). This collection is well characterized by the following features: pileus up to 10 cm, convex, whitish to grey-beige turning slowly brownish when bruised, radially and finely cracked when old, pore surface lemon-yellow bluing when bruised; stipe 7.5-9 x 4.5 cm, cylindrical to

somewhat clavate, yellowish-beige with pink tint and a red zone in the middle or near the base, base yellow, slightly furrowed, covered in all its length with an indistinct net; flesh bluing when cut.

†*Boletus impolitus* Fr.

This collection was made at the end of August 2002 in the area A3 where mixed *Abies-Quercus* trees occur in some places (no oak tree was near of the collected basidioma). Few previous reports from *Quercus* and *Castanea* woods.

†*Boletus luridus* Schaeff.

Collected under mixed *Abies-Castanea* stands in October 1999 and July 2001 (A1S2) and under *Abies* in October 1999 (A2) and at the end of August 2002 (A1S2). This is the first report of a symbiotic relation of this fungus for both *Abies* and *Castanea* plants in Greece.

*Boletus queletii* Schulzer

Collected in September 1998 in a *Castanea sativa* orchard (A1S1). Reported previously once in *Pinus* sp. (Pantidou 1990), twice in *Quercus* spp. (Diamandis 1992, Zervakis et al. 2002b), and in *Castanea sativa* (Polemis et al. 2002b).

*Boletus splendidus* C. Martin ssp. *moseri* Singer & Kuthan

Collected once at the end of August 2002 under *Abies* (A1S2). Practically identical (except of the wider epicutis hyphae, 6-10 µm) to *B. splendidus* C. Martin ssp. *splendidus* Singer & Kuthan, which occurs in hardwood forests. Rare in Greece, recorded once in the past in mixed *Abies-Quercus* forest (Zervakis et al. 2002a).

†*Bovista plumbea* Pers.

Found in October 2000 in a grassy clearing of the *Abies* forest (A1S3), on soil rich in sheep manure. Common in Greece in pasturelands.

*Calocera cornea* (Batsch) Fr.

Common on decaying hardwoods, rare on conifers, recorded once in September 1999 (A1S2). This record is the only one from *Abies* wood for Greece (Zervakis et al. 1998).

\**Ceriporia viridans* (Berk. & Broome) Donk

According to literature, this species is variable in morphology. Our collection, made in October 2001 (A1S2) on a vertical cross-section of an *Abies* log, formed soft resupinate basidiomata, white to pale cream, several centimeters in length; pores 3-5/cm, tubes 2-4 mm in length, becoming pale sordid brown when dry; hyphal system monomitic, basidiospores allantoid, 4-5 X 1-1.5 µm, negative in Melzer's reagent. Rare on conifers (Ryvarden & Gilbertson 1993, Breitenbach & Kränzlin 1986).

\**Chalciporus hypochryseus* (Šutara) Courtecuisse

Collected once in December 1999 under *Abies* (A1S2). Very similar to *C. piperatus*, it differs in having smaller, entirely yellow- to pale ochre-brownish basidiomata and an almost mild taste. In our collection, pileus 1.6-2

cm, stipe 1.8-2 x 0.5-0.6 cm, spores 8-13 x 4.2-5  $\mu$ m, pileipellis hyphae incrustated.

***Cinereomyces lindbladii*** (Berk.) Jülich

Collected twice during 1999 (in April and December) and in April 2000, from the same area (A1S2), it causes white-rot on *Abies* wood (Dimou et al. 2000). This species is easily identified microscopically thanks to the cylindrical, sometimes allantoid spores, the dimitic hyphal system and the slightly amyloid skeletal hyphae, dissolving in KOH.

***Clavariadelphus pistillaris*** (L.) Donk

Rare in conifers according to literature, recorded once in October 1994 (A1S3) (Zervakis et al. 1998). Not common in Greece, recorded twice in the past in *Quercus* spp. (Diamandis & Perlerou 1994, Zervakis et al. 2002b) and once in *Fagus sylvatica* (Dimou et al. 2002a).

***Clavulina cinerea*** (Bull.) J. Schröt.

Collected once in October 2002 under *Abies* (A3). Not very common in Greece.

***Clavulina coralloides*** (L.) J. Schröt.

Collected once in August 2002 on rotten wood of *Abies* (A1S2). Not common, reported as *Clavaria cristata* Fr.: Pers. and *Clavulina cristata* (Fr.) Schröt. in the past.

\****Clitocybe amarescens*** Harmaja

Collected in early November 2000 under *Abies cephalonica* mixed with *Quercus pubescens* (A3), gregarious to caespitose. Pileus 2.5-6.3 cm, plano-convex, depressed in the center, grey- to flesh-brown, hygrophanous, fading to beige when dry (except the margin and sometimes the center); lamellae adnate to decurrent pale grey-beige; stipe usually compressed 3-6 x 0.3-0.35 x 0.7-0.9 cm, concolorous to the pileus. Spores ellipsoid 5.5-7 x 3.8-4  $\mu$ m, basidia 25-30 x 5-7  $\mu$ m, hyphae with clamps. Our collection characteristics fit the descriptions of Hansen & Knudsen (1992), and Bas et al. (1995), but it possessed slightly smaller spores. It is distinguished from the similar-looking *C. metachroa* (Fr.) P. Kumm. by the pale cream spore print (the latter produces white spore-print) and the slightly bitter taste.

†***Clitocybe gibba*** (Pers.) P. Kumm. var. ***gibba***

Recorded at the end of August 2001 under *Abies* (A1S2), gregarious. Pileus size up to 9 cm in diameter, infundibuliform with undulating and sulcate margin, velvety to slightly tomentose towards the center, leather-brown; lamellae whitish and some forked near the stipe; stipe whitish, longitudinally pale beige, fibrillose, cylindrical to flattened sometimes tapering to the base 1.5-4.0 X 1.2-1.6 cm; flesh white and slightly aromatic; spores lacrymoid 6.0-8.0 X 4.0-5.0  $\mu$ m; hyphae in pileipellis parallel and zebrine pigment encrusted, septa with clamps. Recorded also in the *Fagus* forest of this mountain (Dimou et al 2002).

†*Clitocybe nebularis* (Batsch) Quél.

Collected under *Abies cephalonica* at the beginning of November 2000 (A1S3), and of November 2003 (A1S2, and between the Gardiki village and A2 respectively), and under *Pinus nigra* intermixed with *Quercus frainetto* and *Robinia pseudoacacia* (A1S5) in November 2003. This species is rather common in broadleaved woods of Greece, but rare in conifers. Only one report in the past from mixed *Pinus nigra-Fagus sylvatica* wood (Diamandis 1992).

*Clitocybe squamulosa* (Pers.) Fr.

Recorded at the end of October 1998 (caespitose), and at the end of August 2001 (solitary) in *Abies* wood clearings (A1S2). Relatively rare in Greece, three previous reports from conifers (Sibth. & Smith 1806-1845, Pantidou 1980, Athanasiou & Theochari 1999).

\**Clitocybe subsinopica* Harmaja

Collected at the end of August 2002 under *Abies* (A1S2). This collection possessed pileus 3-7 cm, slightly convex to appanate with depressed center, later with undulate margin, orange brown; lamellae whitish; stipe 1.3-3 x 0.5-0.9 cm, concolorous to pileus but paler; spores 5-8 x 4-5.5  $\mu\text{m}$ , broadly ellipsoid, sub-ovoid to pip-shaped, spore-print cream. According to Bigelow (1985) this taxon is a synonym of *C. sinopica* (Fr.) P. Kumm. var. *sinopica*.

*Clitopilus prunulus* (Scop.) Fr.

One collection under *Abies*, in September 1999 (A2). Recorded under conifers and hardwoods in Greece.

†*Collybia cirrhata* (Pers.) Quél.

This collection was made in November 2000 (A1S1) and the basidiomata were appearing in mossy stands, and not directly grown on other decayed macromycetes. Two previous records from agaric hosts (Diamandis & Perlerou 1990, Diamandis 1992).

*Coniophora arida* (Fr.) P. Karst.

Relatively common on wood of conifers and broad-leaved trees, collected in October 2000 from the bark of dead, standing trunk of *Abies* (A1S1).

*Conocybe blattaria* (Fr.) Kühner

Two collections, characterized by pileus ochre-brown to orange-brown (more ochre and lubricous in wet conditions), convex-campanulate, 1.7-3.0 cm in diameter, stipe with very easily movable membranous annulus possessing strongly striate upper surface, 4-spored basidia, lageniform cheilocystidia and basidiospores 11-15 X 6.0-7.5  $\mu\text{m}$ . Specimens with the same features were also collected the same period from conifers on the Taygetos Mt. (Zervakis et al. 2002a). Not any of these collections fit completely to any description given in the literature (Moser 1983, Hansen & Knudsen 1992, Breitenbach & Kränzlin 1995), where there is a confusion about the number of relative taxa. Our description differs from Moser's and Breitenbach & Kränzlin's in the spore dimensions (significantly larger) and from Hansen & Knudsen's in the

4-spored basidia. *C. vexans* P.D. Orton possesses 4-spored basidia but spores 10-12 X 6-6.5 µm. Collected in May 2001 and 2002 under *Abies* (A1S2).

\**Conocybe digitalina* (Velen.) Singer

Collected during May 2001 from a location occupied by *Abies* and scattered mixed *Quercus* trees between the Gardiki village and the area A2, and under *Abies* (A1S2). Pileus bright ocher-orange to ocher brown, conical-campanulate, striate almost to the center, up to 1.8 cm in diameter; stipe cylindrical 5-6.5 X 0.1-0.2 cm, ocher on the top, increasingly brown to the base, pruinose, base somewhat bulbous; spores 9.5-15.5 X 6.5-9 µm; cheilocystidia lecythiform 15-20 X 7-9 µm; caulocystidia lecythiform mixed with clavate and capilliform elements.

\**Conocybe kuehneriana* Singer

Collected in October 2000 in a grassy clearing of the *Abies* forest (A1S2), on ground rich in sheep manure. Pileus 1-1.5 cm, campanulate, striate and reddish-ocher when moist; lamellae flesh-ocher; stipe 5-8 x 0.1-0.2 cm, ocher in the upper part turning to golden-brown downwards to reddish-brown in the base; spores (9-) 10-11.5 x 6-7.5 µm, basidia 4-spored without basal clamp, cheilocystidia lecythiform, caulocystidia polymorphic and capilliform. Similar to *C. siennopylla* (Berk. & Broome) Singer, which has narrower spores (up to 6.5 µm broad).

†*Conocybe rickenii* (Jul. Schäff.) Kühner

Collected in October 2000 in a grassy clearing of the *Abies* forest (A1S2) and end of May 2002 around a sheepfold in the alpine zone, on ground rich in sheep manure in both cases. One previous report from Greece (Polemis et al. 2002a).

*Coprinellus domesticus* (Bolton) Vilgalys, Hopple & Jacq. Johnson

Recorded in April 1999 on a fallen, decayed trunk of *Juglans regia* (in the Gardiki village). One recent record on the same host (Zervakis et al. 2002b). Pantidou (1990) had also reported the fungus from grassland but as it is strictly associated with rotting wood her record is dubious.

†*Coprinus disseminatus* (Pers.) Gray

On mixed sawdust from *Abies cephalonica* and *Populus alba* wood, in April 2001 (A1S1). Some previous records from *Quercus* and *Fagus* forests.

\**Cortinarius calochrous* subsp. *coniferarum* var. *barbaricus* Brandrud

This collection was made at the end of November 2003 under *Abies* (A1S2). According to Brandrud et al. (1989 ff.), the complicated *calochrous* complex is divided into two subspecies: subsp. *calochrous* (with two varieties) occurring in broadleaved forests with basidiomata more dwarfish, pileus ocher-yellow to whitish and spores smaller than those of the conifer associated subsp. *coniferarum* producing ochraceous-brown pilei (it includes three varieties). The var. *haasii* of the latter subspecies is distinguished from all the others by its negative KOH reaction. The var. *coniferarum* (most common in conifers) possessed pale lilac lamellae when young, while var.

*barbaricus* is characterized by the strongly and persistently lilac lamellae (as those in this collection). Pileus up to 8.5 cm, stipe up to 7.5 x 1.5 cm, spores 7.5-11 x 5-6  $\mu\text{m}$ , coarsely verrucose, ellipsoid to amygdaliform; taste mild, KOH and lugol reaction pink.

***Cortinarius calochrous* subsp. *coniferarum* var. *coniferarum*** (M.M. Moser) Nezdoin

This collection was made at the end of October 1999 under mixed *Abies-Quercus* trees (A3). As our collection possessed spores measuring 10.5-13.5 x 5-7.5  $\mu\text{m}$  and oblong habitus (pileus 6.5 cm, stipe 9 x 1.4 cm), it is assigned to subsp. *coniferarum*. The spore size is closer to this of the var. *haasii* (M.M. Moser) Brandrud (10.5-12.5 x 6.5-7.5  $\mu\text{m}$ ), but this is the only variety with negative KOH reaction (our collection presented red reaction). Brandrud et al. (1989 ff.) have reported a continuous spore-size variation between these varieties. Only one previous report (Delivorias & Gonou-Zagou 2000b).

**\**Cortinarius cinnamomeoluteus*** P.D. Orton

Collected in early November 2000 and at the end of August 2002 under *Abies*, among grasses and mosses (A1S2). Pileus 1.8-4 cm in diameter, convex to broadly campanulate, radially fibrillose, olive-brown with olive-yellow margin; lamellae yellow-mustard to mustard; stipe cylindrical 3-5 x 0.35-0.6 cm, yellow to yellow-brown, longitudinally fibrillose, sometimes with annular zone; spores 7-11 (-12) x 4.5-6.5 (-7)  $\mu\text{m}$ .

***Cortinarius croceus*** (Schaeff.) Gray

Collected at the end of August 2002 under *Abies* among mosses (A3), and in the needle litter (A1S2). Similar to *C. cinnamomeoluteus*, but with smaller spores (6.5-8 x 4.5-5  $\mu\text{m}$ ). Rare species, recorded only once in the past (Zervakis et al. 2002a).

***Cortinarius dibaphus*** Fr.

Recorded once during autumn 1996 under *Abies* (A1S1) (Zervakis et al. 2002a). Rare species, reported once more in the past (Pantidou 1973).

**\**Cortinarius dionysae*** Rob. Henry

Collected once in November 2000 under *Abies* (A1S2). Pileus 5.5-7 cm, convex to broadly umbonate, lubricous in humid weather, ocher-, grayish-, red-beige to brown, finally radially fibrillose; lamellae grey-violet turning grey-brown later; stipe 6.5-8 cm with enlarged base, initially pale violet-whitish, later grey to olive-brown; spores 7-12 x 3.8-6.5  $\mu\text{m}$ , amygdaliform, verrucose; lamellar ends sterile but not distinct cystidia were observed. This collection differs from that in the literature (Brandrud et al. 1989 ff., Breitenbach & Kränzlin 2000) in presenting cap cuticle bitterish like the similar-looking *Cortinarius anserinus* (Velen.) Rob. Henry. However, the latter has more yellow-ocher colors, and it is considered associated exclusively with broadleaved trees, especially *Fagus*.

***Cortinarius glaucopus*** (Schaeff.) Fr. var. ***glaucopus***

Collected in November 2000 under *Abies* (A1S3). Three previous reports from *Abies cephalonica* (Diamandis & Minter 1983), *Abies borisii-regis* (Diamandis 1985) and from *Fagus sylvatica* (Zervakis et al 1998) as *C. glaucopus*.

\****Cortinarius huronensis*** var. ***olivaceus*** Ammirati & A. H. Sm.

This collection was made in November 2000 under *Abies* among mosses (A3). Pileus 2.1-3.9 cm, plano-convex, centre slightly depressed with a small umbo, smooth but radially fibrillose, ochre- to red-brown with an olivaceous tint, margin somewhat sulcate-denticulate; lamellae mustard-colored, then red-brown with yellowish edges, in KOH excrete red pigment; stipe 4.5-5.5 x 0.4-0.5 cm yellow with reddish-brown veil remnants; spores 7-10 (-11) x 4-5.5 (-6)  $\mu\text{m}$ , many basidia with yellow- to pink-brown content. The other variety of this species has dark red-brown colors, larger spores and lacking olivaceous tints. Another closely related species is *C. tubarius* Ammirati & A. H. Sm. with spores of similar size but less verrucose (Breitenbach & Kränzlin 2000), basidia without colored content and lamellae reacting brown with KOH.

***Cortinarius infractus*** (Pers.) Fr.

Recorded only once in October 1998 under *Abies* (A2). Although it was abundantly recorded on Mt. Taygetos during 1999 (Zervakis et al. 2002a), it must be considered as rather rare because it has been reported only once before (Maire & Politis 1940).

\****Cortinarius mucifluus*** Fr.

Recorded growing solitary in December 1999 under *Abies* (A1S2). This species differs from *C. lividochraceus* (Berk.) Berk. (which occurs in broadleaved woods) in having stipe white without any trace of blue or violet, and pileus only slightly sulcate in the margin. The spores of our collection were somewhat broader [10.5-15.5 (-16.5) x 7.5-10 (-12)  $\mu\text{m}$ ] than those reported in the literature (Moser 1983, Hansen & Knudsen 1992).

\****Cortinarius norvegicus*** Høiland

Recorded in early November of 1996 and 1998 under *Abies* (A1S2), among mosses, gregarious. Pileus 2.5-3.5 cm shield-shaped with a low umbo, copper-brown, dark brick to orange-rusty tawny, radially fibrillose; lamellae bright orange-yellow, later deep yellow-orange, finally rusty; stipe 3-4 x 0.4-0.5 cm, gold-yellow to yellow-orange with fine red-brownish velar fibrils in the middle of its length. Spores 7-10 (-11) x 4.5-6  $\mu\text{m}$  (in the first collection slightly smaller). A species of sub-alpine regions, associated usually with *Betula* and *Salix*, rare in conifers (Brandrud et al. 1989). The same authors consider it as subspecies of *C. croceus*. The bright colors of this collection are reminiscent of the *Salix* associated *C. uliginosus* Berk., but in the latter, the spores are larger, the pileus is not so brown and the stipe is significantly longer. Long stiped are also the typical coniferous species *C. bataillei* (M.M.

Moser) Høiland and *C. croceoconus* Fr (which moreover is characterized by an acute umbo).

***Cortinarius purpurascens* (Fr.) Fr.**

Recorded once during autumn 1996 under *Abies* (A1S1). Rare species, reported once in the past (Diamandis 1985).

†***Cortinarius sommerfeltii* Høiland**

Collected at the end of October 2002 under *Abies* mixed with *Quercus coccifera* (A3). Pileus 2.3-5.5 cm, initially convex-campanulate, finally plane to somewhat wavy with umbo, radially and faintly fibrillose, cinnamon- to dark chestnut-brown; lamellae rusty; stipe 5-8.5 x 0.3-0.6 cm, olivaceous-yellow, pale orange fibrillose in the upper half and yellow toward the base; spores ellipsoid 7-9 x 5-6 µm, marginal hyphae catenate with terminal cells ovoid-pyriform-clavate 12-17 x 10-12 µm. Reported once in the past as *C. cinnamomeobadius* Hry. by Diamandis (1992), but his photo does not fit to the given description.

\****Cortinarius spadacellus* (M.M. Moser) G. Garnier**

This species is close to *C. varicolor* (Pers.) Fr. occurring also in coniferous woods, but it lacks the strong earthy smell, the pileus has no violaceous colors, even when young, and its spores are smaller. It was characterized by the persistently viscid-glutinous cap and the strongly encrusted pileipellis hyphae. This collection, made beginning of November 2003 under *Abies* (between the Gardiki village and A2), presented pileus 6-7 cm, convex, radially innately fibrillose, brown in the centre fading brown-fulvous to ochraceous-brown toward margin; lamellae grey-violaceous; stipe 5-6 x 1.2-1.5 cm whitish-grey with a lilac tint at the top but soon browning; smell earthy but not strong (Brandrud et al. 1989 ff. refer musty) disappearing after drying; spores 8-10 x 5-6 µm.

\****Cortinarius splendens* Rob. Henry subsp. *meinhardii* (Bon) Brandrud & Melot**

A rare species collected in December 1999 under *Abies* (A1S3). Our collection presented quite bigger basidiomata than those reported in literature. Pileus 10-14 cm, plano-convex to undulate, glutinous, sulphur-yellow with olive- to chrome-brownish patches; lamellae concolorous, finally yellow-brownish; stipe yellow, 11-13 x 2.2-2.6 cm (base bulbous), fibrillose, with brownish fibrils in the older basidiomata; flesh yellow, smell unpleasant, taste somewhat soapy unpleasant; spores 7.5-11 x 5-6 µm, distinctly verrucose, rather ellipsoid than amygdaliform. *C. splendens* subsp. *splendens* occurs in beech forest, it has slender and more sulphur-yellow basidiomata, and spores amygdaliform to citriform.

***Cortinarius traganus* (Fr.) Fr.**

Recorded once during the autumn 1996 under *Abies* (A1S1) (Zervakis et al. 1998). Relatively rare, reported in the past twice from *Abies cephalonica* (Diamandis 1992) and from *Quercus frainetto* (Zervakis et al. 2002b).



†*Cortinarius trivialis* J.E. Lange

Collected in mixed *Abies-Quercus* forest in September 1999 (A3) and at the end of November 2003 under *Castanea sativa* mixed with *Quercus* sp. (A1S5). Common, mainly in *Quercus* woods.

*Cortinarius variegator* (Pers.) Fr.

Collected at the end of October 2002 (A3) under *Abies*. This species is characterized by the strong earthy odor and the reddish-brown cap with violaceous margin when young, but it very soon becomes concolorous. This collection comprised mature basidiomata. Pileus up to 15.5 cm, dry, plano-convex with center slightly depressed, ocher- to reddish-brown with an indistinct violet tint on the margin, smooth to fibrillose-rimose; lamellae relatively distant, broad, rusty-brown, edges wavy; stipe up to 7 x 4.2 cm, cylindrical-fusiform, grey-brownish; smell strongly earthy, unpleasant, taste mild; spores (8-)10-13(-14) x (5.5)6 x 7 µm, basidia with basal clamp. In the literature, the spores are reported as being slightly shorter (up to 12 µm). One previous record from southern Greece (Zervakis et al. 2002a).

†*Craterellus cornucopioides* (L.) Pers.

Rare species in the investigated area, recorded once in November 1996 under *Abies* (A1S3). Three previous reports in broadleaved forests (Diamandis 1992, Diamandis & Perlerou 1994, Constantinidis 2002a) but possibly it is not rare.

*Crepidotus calolepis* (Fr.) P. Karst.

On *Platanus orientalis* in October 1998 (A1S1). This record is just the second one for this variety, but it is probable that some of the numerous records under the name *C. mollis* belong to var. *calolepis*.

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

Collected in October 1998 on dead bark-less wood of *Platanus orientalis* (A1S1). Two previous records on *Fagus*, reported by the names *Dochmiopus sphaerosporus* Pat. (Maire & Politis 1940) and *Crepidotus sphaerosporus* (Pat.) J.E. Lange (Dimou et al. 2002). Although Hansen & Knudsen (1992) do not reject the synonymy *cesatii-sphaerosporus*, they adopt Lundell's sense and they differentiate *C. sphaerosporus* as a conifer-associated species with spores 6-9 x 5.5-7 µm from *C. cesatii* (growing on deciduous wood and forming larger spores, 7-11 x 6-8.5 µm). Nevertheless, both our collections from *Fagus* (op. cit.) and *Platanus* possessed spores less than 9 µm long.

†*Crucibulum leave* (Huds.) Cambly

On fallen *Abies* twigs and wood debris, collected in October 1995, December 1999 and end of August 2001 (A1S2), and on *Pinus nigra* twigs in October 2000 (A1S5). Not very common.

\**Crustoderma dryinum* (Berk. & M.A. Curtis) Parmasto

Collected in October 1998 on decaying wood (A1S1). Basidiomata resupinate, bright yellow-saffron to yellow-cinnamon, 150-170 µm thick; hyphal system monomitic, septa with clamps, basal hyphae thick-walled;

cystidia cylindrical, thick-walled (except in the apex), 80-120 x 5-8  $\mu\text{m}$ , projecting 40-60  $\mu\text{m}$ ; spores 7.5-9 x 3-3.5 (4)  $\mu\text{m}$ .

†*Cyathus striatus* (Huds.) Hoffm.

Recorded at the end of August 2001 on wood debris of *Platanus orientalis* and *Alnus glutinosa* (A1S1). Not very common, but probably overlooked.

\**Cystoderma adnatifolium* (Peck) Harmaja

Pileus 2.5-4.1 cm, convex (sometimes lobed), expanded sometimes wavy, bright reddish-brown to reddish-orange fading sometimes to ochreous in the margin, surface very finely granulose or finely areolate; lamellae whitish, broadly adnate; stipe 2-2.5 x 0.35-0.5 (-6) cm, often attenuated to the base, concolorous to the pileus, covered with small whitish squamules from the annular zone up to base; spores 3.5-5 (-5.5) x 2.5-3.5, ellipsoid, non amyloid; cystidia absent. Collected in December 1999 under *Abies* on mossy ground (A1S2).

*Cystoderma amianthinum* (Scop.) Fayod

The less common among the *Cystoderma* species recorded up to now in Greece. Collected once in December 1999 under *Abies* (A1S2).

†*Cystoderma cinnabarinum* (Alb. & Schwein.) Fayod

Easily separated microscopically from the other reddish-orange species thanks to its cystidia. Collected under mixed *Abies cephalonica-Castanea sativa* trees in October 1998 (A1S1), under *Abies* in November 2000 (A3) and under mixed *Pinus nigra-Quercus frainetto* at the end of November 2003 (A1S5).

*Cystoderma fallax* A.H Sm. & Singer

Pileus 3.2 cm in diameter, surface mustard colored granulose; lamellae yellowish-pink; stipe 2 x 0.8 cm with ascending membranous ring sheathed downwards, whitish and smooth above the ring and concolorous squamulose below; spores amyloid, 4.5-5.5 (-6) x 3-4  $\mu\text{m}$ , ellipsoid, lacrymoid or subglobose. The closely related *C. intermedium* Harmaja possesses narrower and distinctly ellipsoid spores. Recorded once at the beginning of 1998 in mossy stands under *Abies* (A1S2). Rare species recorded only once in the past (Pantidou 1980).

\**Cystoderma tuomikoskii* Harmaja

This species is characterized by the presence of ascending membranous ring sheathed downwards, the fulvous-brown pileus and the broadly ellipsoid to subglobose spores (Hansen & Knudsen 1992). Pileus up to 3.2 cm, fulvous-brown with rusty tawny center and fading fulvous-ochre toward the margin, slightly wrinkled radially from the half radius to the margin; lamellae whitish, adnexed to adnate; stipe up to 2.2 x 0.6 cm, rusty-tawny above the annulus (but apex whitish sometimes), lower surface of annulus and stipe under the annulus covered with fulvous squamules; spores amyloid 4.5-6 x 3-4  $\mu\text{m}$  (in Hansen & Knudsen somewhat bigger, 5-7 x 3.5-4.5  $\mu\text{m}$ ). *C. fallax* A.H. Sm. & Singer and *C. intermedium* Harmaja are close but the former

possesses smaller spores and the later pileus ochre to fulvous-brown and ellipsoid spores (Hansen & Knudsen op. cit.). Collected in November 2003 (A1S2) and 2004 (from a place between the village Gardiki and A2), under *Abies* on mossy ground.

†*Dacrymyces capitatus* Schwein.

Collected in May 2001 from decaying *Abies* wood in a location between the Gardiki village and the area A2. One previous report on *A. borisii-regis* (Minter 1988).

\**Dacrymyces estonicus* Raitv.

Recorded at the end of August 2002 on dead twigs of *Pinus nigra* (A1S5). This species is characterized by the absence of clamps, the suballantoid to subovoid (19-23 x 10-11 µm), 7-septate (in the maturity) spores (producing rod-shaped conidia 3-4 x 1.5 µm) and by basidia cylindrical which inflate near the base before narrowing again to the basal septum (the carrying hyphae are characteristically narrower than the basidium); basidiomata pulvinate-turbinate, bright yellow, up to 4 mm.

*Dacrymyces stillatus* Nees

Found repeatedly on *Abies* wood both in the teleomorph and anamorph states. Common on conifers and hardwoods in Greece.

†*Entoloma chalybaeum* (Fr.) Noordel. var. *chalybaeum*

Rare species, recorded among mosses in a clearing of mixed *Abies-Quercus coccifera* trees, at the end of October 2002 (A3). Pileus 2 cm in diameter, convex, radially fibrillose to finely squamulose, not striate, deep grey-blue; lamellae blue to pale blue-pink with brownish edge; stipe 2.7 x 0.2 cm, blue-lilac; spores 9-13 x 6.5-8.5 µm, cheilocystidia cylindrical, septa without clamps. Only one previous report (Maire & Politis 1940) as *Leptonia chalybaea* (Pers.: Fr.) Karst.

†*Entoloma hirtipes* (Schumach.) M.M. Moser

Collected in early May 2003 under *Abies cephalonica* intermixed with *Castanea sativa* (A1S2). Quite common in Greece.

†*Entoloma incanum* (Fr.) Hesler

Recorded in September 1999 and at the end of August 2001 on the sides of an irrigating ditch, under mixed *Abies cephalonica*, *Pinus nigra* and *Robinia pseudoacacia* (A1S1). Three previous records in fields (Pantidou 1990, Constantinidis 2002) and under *Pinus nigra* (Zervakis et al. 2002a).

\**Entoloma rhodocylix* (Lasch) M.M. Moser

Collected in September 1999 from the needle litter, under *Abies* (A2). Habit collybioid to omphalinoid; pileus 0.8-1.5 cm, pale ocher-pinkish-brown, initially convex, then depressed, margin slightly grooved; lamellae adnate to decurrent, cream to light beige; stipe 2.5-3 x 0.1-0.2 cm, concolorous to the pileus, base somewhat deeper; spores isodiametric 8-10.5 x 8-9.5 µm, basidia (2-) 4-spored and clamped, cystidia indiscernible, in clusters, cylindrical to lageniform about 50 x 9 (base) -6 (neck) µm (neck tapering to 2 µm).

\**Entoloma rhodopolium* f. *rhodopolium* (Fr.) P. Kumm.

One collection end of November 2003 under *Castanea sativa* stands intermixed with *Quercus* sp. and *Abies cephalonica* (A1S5). Pileus 4.8-8 cm, initially convex but later with centre slightly depressed and sometimes small umbo, brownish to ocher-brownish with an olivaceous tint, radially innately fibrillose, hygrophanous, margin striate, crenate; lamellae pink-flesh colored, edges red-spotted; stipe 5-7.5 x 0.5-0.7 cm (width in the middle), enlarged toward the base and the apex, grey-whitish with an olivaceous tint; smell mild, faintly herbaceous; spores 7.5-10 x 7-9  $\mu\text{m}$ , basidia clamped, cells of the tramal hyphae shorter than 120  $\mu\text{m}$ . The other form, f. *nidorosum* (Fr.) Noordel. differs in having less isodiametric (narrower) spores and a nitrous smell.

*Exidia pithya* (Alb. & Schwein.) Fr.

Recorded in March 2000 on the bark of a dead *Abies* branch (between Gardiki village and A2). Although recorded only twice in the past (Diamandis & Perlerou 1990, Zervakis et al. 2002a), it should not be a rare species.

*Exidia truncata* Fr.

Very common on branches and twigs of *Quercus* spp., appearing during spring (A1S5). Surprisingly, only one more record on the same host (Zervakis et al. 2002b).

*Fistulina hepatica* (Schaeff.) With.

Recorded on dead stump (October 1995, September 1998) and on living trunk (September 1998) of *Castanea sativa* (A1S2, A1S5).

†*Galerina autumnalis* (Peck) A.H. Sm. & Singer

Collected in October 1998 on *Abies* rotten stump (A1S2). Only one previous record from *Pinus* (Pantidou 1990).

\**Galerina badipes* (Fr.) Kühner

Collected in December 1999 from an *Abies* stump (A1S2). This collection belongs to the 4-spored form and possesses spores moderately verrucose, 9-11 x 5.5-6.5  $\mu\text{m}$ , some with loosening perispore. The microscopic features are similar to those of *G. marginata* (Batsch) Kühner, except of the slender cheilocystidia and the presence of (rare) pleurocystidia. Pileus 1.7-3.2 cm, convex with a small central depression, ocher-brownish, hygrophanous; stipe 3.5-4.5 x 0.3-0.4 cm with whitish annulus zone, cream to beige, pruinose above, grey-brown below with adder-like beige patches, darkening towards the base.

\**Galerina uncialis* (Britzelm.) Kühner

Collected in October 2000 on decaying branches of *Pinus nigra* (A1S5). Characteristic of this species are the presence of clamps, the moderately warty spores (sometimes with a calyptra) and the absence of pleurocystidia. The pileus was 1.5-2.5 cm, hemispherical to convex, ocher, margin faintly striate; lamellae concolorous, broadly attached; stipe 3.5-7 x 0.3-0.45 cm

with membranous annulus, ocher-grey fibrillose under annulus, ocher-whitish above and finely squamulose above; spores 7-10 x 5.5-6 µm, basidia 4-spored, cheilocystidia fusiform to lageniform 35-65 x 7-13 µm with long neck.

***Galerina vittiformis*** (Fr.) Singer var. ***pachyspora*** A.H. Sm. & Singer

Collected in November 2000 in mosses (A1S2). This collection, as well as a previous one from Taygetos Mt. in Peloponnisos (Zervakis et al. 2002), possessed 2-spored clamped basidia, but the spores were narrower than those cited in the literature (6-7 µm broad instead of 6-9.5 µm, Hansen & Knudsen 1992). *G. vittiformis* var. *vittiformis* f. *tetraspora* Smith & Sing. has spores 5-7 µm broad and 4-spored basidia.

***Geastrum berkeleyi*** Masee

One collection in May 2003 (area between A1 and A2). Rare species, only one previous report (Zervakis et al. 2002a).

†***Geastrum lageniforme*** Vittad.

Collected in October 2000 from the needle litter under *Abies* (A2). Previously reported from *Fagus* forest and under *Robinia pseudoacacia* in a park (Constantinidis 2002).

***Geastrum triplex*** Jungh.

Recorded in October 1998 under mixed trees of *Abies cephalonica*, *Alnus glutinosa* and *Platanus orientalis* (A1S1) and in September 1999 under *Abies* (A2).

***Gloeoporus dichrous*** (Fr.) Bres.

Collected at the beginning of November 2003 from decaying *Abies* stump (A1S2). Three previous records, one of them on *Abies cephalonica* from southern Greece (Peloponnisos) (Diamandis & Minter 1983).

†***Gymnopilus sapineus*** (Fr.) Maire

This species was collected once in early November 2000 from a fallen rotting *Abies* trunk (A1S2). Pileus 3.7- 6.0 cm shield-shaped, yellow- to ochre-brown, velutinous to finely squamulose; lamellae ochre-yellow; stipe 2.5-3.5 x 0.4-0.6 cm, yellow at the top, turning gradually reddish-brown downward, longitudinally fibrillose. It is very closely related to *G. penetrans* (Fr.) Murril and *G. hybridus* (Fr.) Singer (both considered as synonyms by some authors) differing microscopically in the width of the pileipellis hyphae: the width in *G. sapineus* (as well as in the specimens of our collection) is 10-20 µm while in the other two species it is under 10 µm. Moreover, in our collection we observed 2-spored basidia, not previously reported in literature. Breitenbach & Kränzlin (2000) reported 2-spored basidia for *G. picreus* (Pers.) P. Karst., which however differs in the size and color of the basidiomata. Only one previous report (Maire & Politis 1940) on *Pinus nigra*.

\****Gymnopus ocior*** (Pers.) Antonín & Noordel.

Collected at the end of May 2002 near the base of an *Abies* tree, among mosses (A1S1). It is characterized by pileus 1.7-5 cm, convex to applanate

with a central papilla or depressed center, with marginal zone sometimes undulating, hygrophanous, dark brown to yellow-brown when moist, discoloring rapidly to pale beige-brown when dried; lamellae crowded, adnate, almost white; stipe 3-6.5 x 0.3-0.5 cm, cylindrical, yellowish discoloring white-cream when dried, often rooting in the needle litter by almost half its length, always with long rhizomorphs on the base. Spores ellipsoid to lacrymoid, 5-6.5 x 3-3.5  $\mu\text{m}$ , cheilocystidia irregularly clavate or sphaeropedunculate, lobed to diverticulate, pileipellis structure of *Dryophila*-type with elements 8-28  $\mu\text{m}$  in diameter.

***Hebeloma crustuliniforme*** (Bull.) Quél.

Collected under *Abies* in November of 1996 (A1S3) and 2000 (A1S2). Common, mainly in the coniferous woods of Greece.

***Hebeloma eburneum*** Malençon

Collected once in this mountain in November 2000 under *Abies* on mossy ground (A3). A typical Mediterranean species associated with conifers, but quite rare in Greece reported only twice in the past (Pantidou 1983, 1990).

***Hebeloma edurum*** Métrod ex Bon

Collected in October 1998 under intermixed trees of *Abies cephalonica* and *Platanus orientalis* (A1S1). Reported once in the past (Delivorias & Gonou-Zagou 2000b). Some authors consider it as synonym of *H. senescens* (Batsch) Berk & Broome together with *H. sinuosum* (Fr.) Quél.; the latter is also reported once (Diamandis 1985).

**\**Hebeloma perpallidum*** M.M. Moser

Collected at the end of November 2003 under *Abies* on mossy ground (A1S2). This collection was macroscopically similar to *H. eburneum* but it differed in microscopic features. Pileus 5.5-6 cm plano-convex, cream to clay-flesh colored; lamellae initially almost concolorous, weeping; stipe 4 x 0.9 cm cylindrical, base slightly enlarged, whitish, pruinose-fleecy toward the top; taste practically mild; spores 11-15 x 6.5-8  $\mu\text{m}$ , amygdaliform to citriform, punctate to slightly verrucose; cheilocystidia mostly slender capitate, but some also slender clavate, lageniform or irregular.

**†*Hebeloma sinapizans*** (Paulet) Gill.

Collected in September 1999 under intermixed *Abies-Quercus* trees (A3) and in *Abies* (A2), in October 2000 under intermixed *Abies cephalonica-Platanus orientalis* trees (A1S1) and in November 2003 under *Castanea sativa* (A1S5). Common, mainly in hardwoods in Greece.

***Hohenbuehelia petalodes*** (Bull.) Schulzer var. *petalodes*

Collected once in October 1995 under *Quercus* intermixed with *Abies* (A1S5). Several previous records, mainly as *H. geogenia* (DC.) Singer (considered as a distinct species by some authors).

***Hydnellum aurantiacum*** (Batsch) P. Karst.

Collected in October 2002 under *Abies* trees (A3). This species is characterized by pileus radially wrinkled, concentrically zoned, ocher-

orange-brown, with whitish marginal zone, by the dense, whitish (turning brown when old) spines, by the orange stipe with duplex flesh (thin section not turning violet in KOH). Only one previous record (Diamandis & Minter 1983).

***Hydnellum auratile*** (Britzelm.) Maas Geest.

Collected under *Abies* end of October 1999 (A3), August and October 2002 (A3, A1S2). This species is very closely related to *H. aurantiacum*, but the pileus never is zoned and lacks the whitish marginal zone, the spines are less dense and pale orange when young, the stipe is very short and a thin section of the stipe does not turn violet in KOH. Only one previous report, under *A. cephalonica* too (Delivorias & Gonou-Zagou 2000b), but it is probably not rare.

†***Hydnellum concrescens*** (Pers.) Banker

Collected once in October 2002 under *Abies cephalonica* (A3). Only two previous records under *Abies borisii-regis* (Perlerou & Diamandis 2000) and *Quercus frainetto* (Zervakis et al 2002b).

***Hydnellum ferrugineum*** (Fr.) P. Karst.

Relatively common, recorded several times since October 1998 under *Abies* and intermixed *Abies-Quercus* trees (A2, A3 respectively). Nevertheless only two previous reports under *Abies cephalonica* (Diamandis 1992) and *Pinus nigra* (Zervakis et al. 2002a).

†***Hydnellum scrobiculatum*** (Fr.) P. Karst.

Collected once in October 2002 under *Abies cephalonica* (A3). Two previous records under *Alnus glutinosa* (Diamandis 1992) and *Quercus frainetto* (Zervakis et al. 2002b).

\****Hydnellum spongiosipes*** (Peck) Pouzar

This species grow solitary, and it was collected in October 2001 from a clearing of an intermixed *Abies-Fagus* clump of trees (A2), among herbs; although it is known to be associated with broad-leaved trees, it was recorded to grow much closer to the *Abies* rather than the *Fagus* trees. Basidioma (found in early stage) inverted conical, 3.5 cm in height; pileus 3 cm in diameter, more or less rounded, convex with center slightly depressed, velutinous, beige to whitish towards the margin, darkening when touched; spines 3 mm long whitish to brown, covering the conical lower part of the basidioma on its whole length; stipe short, 0.5 cm in diameter, orange-reddish, felty, enlarging to a rooting bulbous 1.2 cm in diameter; spores light brownish, irregularly subglobose, tuberculate, 5.5-7 X 4.5-5.5 µm; septa without clamps.

***Hydnum rufescens*** Schaeff.

Recorded once during autumn 1995 under *Abies* (A1S2). Several records from deciduous forests but this is the only record in conifers for Greece (Zervakis et al. 1998).

**\**Hygrocybe phaeococcinea*** (Arnolds) Bon

Collected in March 2000 under intermixed *Abies-Platanus* trees (A1S1), growing on a stone, which was on grassy ground and covered with foliaceous lichens (*Parmelia*). Pileus 1-2 cm, plano-convex to applanate, surface dry, mat, ochre- to brownish-red and deep brown-red in the center; lamellae broadly adnate to slightly decurrent, yellowish-salmon; stipe 2-2.2 x 0.2-0.25 cm almost concolorous to the pileus, paler toward the base, base somewhat whitish; spores obovoid, broadly ellipsoid to ellipsoid 6.5-10 x 4-6.5  $\mu\text{m}$  with drops inside, basidia up to 40 x 10  $\mu\text{m}$ , hair-like, pseudocystidia present on the lamellar edge; hyphae of hymenophoral trama isodiametric with slightly constricting septa and cells up to 150  $\mu\text{m}$  long.

**†*Hygrocybe virginea*** (Wulfen) P.D. Orton & Watling

Collected at the end of November 2003 on the margins of an *Abies* forest clearing, among herbs (A1S2).

***Hygrophoropsis aurantiaca*** (Wulfen) Maire

Collected under *Abies* in October 1999 and 2001 (A1S2). Reported twice in the past in *Pinus nigra* and *Picea abies* (Diamandis 1992) and in intermixed *Pinus nigra-Abies cephalonica* woods (Athanasiou & Theochari 1999).

**†*Hygrophorus agathosmus*** (Fr.) Fr.

Easily recognizable species thanks to its strong smell of bitter almonds. Collected in mid-December 1999 and at the end of November 2003 under intermixed *Pinus nigra-Juniperus oxycedrus-Quercus frainetto* stands (A1S5). Only one previous record (Athanasiou & Theochari 1999).

**\**Hygrophorus atramentosus*** (Alb. & Schwein.) H. Haas & R. Haller Aar.

Collected at the end of November 2003 under *Abies* on mossy ground (A1S2), growing in groups. Pileus up to 8 cm plano-convex, deep grey-brown to grey-blackish with patches bluish-blackish; lamellae adnate, initially whitish later grey-whitish, distant, thick, intervenose in their bases; stipe up to 6 x 2.4 cm brown-grey, brown blackish, grey-blackish on the top, turning paler downward to a whitish base; spores 7-9 x 4.5-5 (-5.5)  $\mu\text{m}$ . This species is considered identical with *H. camarophyllus* (Alb. & Schwein.) Dumée, Grandjean & Maire by some authors. However, the latter presents dominant brown colors.

**\**Hygrophorus hyacinthinus*** Quél.

Rare species, recorded once in November 1996 under *Abies* (A1S3). Pileus 5-5.5 cm, convex and undulating, white; lamellae white; stipe 4 x 0.5 cm, white, cylindrical but sometimes with tapering base; spores 6-9 x 4.5-6  $\mu\text{m}$ . Characteristic of this species is the white color and the strong odor of hyacinths. It resembles *H. agathosmus* Fr., but it differs in color and odor (the latter having grey colors and smell of bitter almonds). Some authors state that this species produces bigger spores than those measured in our specimens (Hansen & Knudsen 1992, Breitenbach & Kränzlin 1991).



†*Hygrophorus hypothejus* (Fr.) Fr.

This mushroom appears late in autumn and at the beginning of winter. Collected in December 1999 and at the end of November 2003 under *Pinus nigra* intermixed with *Quercus frainetto* and *Robinia pseudoacacia* and *Juniperus oxycedrus* intermixed with *Q. frainetto* (A1S5). Rather common, mainly under *Pinus* spp.

\**Hygrophorus latitabundus* Britzelm.

One collection at the end of November 2003 under *Juniperus oxycedrus* intermixed with *Pinus nigra* and *Quercus* (A1S5). Pileus 6.5-8.5 cm appanate-undulate, slimy, dark grey-brown to brown in the center but somewhat paler to ocherish-brown toward the margin; lamellae whitish, adnate; stipe 6-7 x 1-2.5 cm, slimy, fusiform with a distinct white annular zone on the top and mottled pale olive-brown below, KOH and ammonia reactions on the base orange; spores 7.5-11 x 5-7 µm.

*Hygrophorus marzuolus* (Fr.) Bres.

Although the record from this area (in April 1996) was just the second for Greece (Zervakis et al. 1998), this species seems to be rather common under *Abies*; its abundance is depending on the spring rainfalls, while as the pileus opens before coming out of the soil, it is target for the wild boars and it is sometimes difficult to be found.

\**Hygrophorus ponderatus* Britzelm.

Collected at the end of November 2003 under intermixed *Quercus frainetto*, *Castanea sativa* and *Abies cephalonica* trees (A1S5). Similar to *H. eburneus* (Bull.) Fr. but more robust in habitus. Basidiomata not fully developed, pileus up to 6.5 cm, viscid, convex with a low umbo, whitish with centre pale cream-ocherish, margin inrolled; lamellae white, adnate-subdecurrent; stipe cylindrical up to 7 x 2.1 cm, white, viscid, longitudinally somewhat fibrillose-grooved. Spores ellipsoid 7-10 x 4-5.5 µm, larger than those quoted in literature [6.5-8 x 4-5 µm in Moser (1983), 6.5-9 x 4.5-5 µm in Cetto (1993)].

*Hymenochaete rubiginosa* (Dicks.) Lév.

This species recorded twice on dead decorticated wood of *Castanea* (A1S2). The first record initially was erroneously reported to grow on *Abies* (Zervakis et al. 1998).

*Hyphodontia arguta* (Fr.) J. Erikss.

On rotten *Abies* trunk covering the bark, the wood surface, the inner sides of insect galleries etc. in October 1999 (A1S2) (Dimou et al 2000).

†*Hyphodontia aspera* (Fr.) J. Erikss.

Collected in April 2000 from rotten *Abies* wood (A1S2). One previous record on *Fagus* wood (Dimou et al. 2002).

†*Hyphodontia sambuci* (Pers.) J. Erikss.

Recorded at the end of August 2002 on a barkless twig of *Sambucus nigra* (A1S1). Two previous records, on *Fagus sylvatica* (Diamandis 1985) and on *Thymus capitatus* (Polemis et al. 2002a).

\**Inocybe adaequata* (Britzelm.) Sacc.

Collected at the end of May 2002 under *Abies* (A1S2). This reddening member of the section *Rimosae* is very similar to *I. erubescens* A. Blytt which has at first pileus whitish. Our collection possessed pileus dark fawn with a reddish flush at its early stages of development (like *I. adaequata*) but spores measured 8-11.5 (-13) x 5-7 (-8)  $\mu\text{m}$ , slightly smaller than that reported in literature for both taxa.

\**Inocybe curvipes* P. Karst.

Collected in September 1999 from a grassy clearing of the *Abies* wood (A3). This species is characterized microscopically by the broad metuloid cystidia (cheilocystidia 32-40 x 16-25  $\mu\text{m}$ , sometimes papillate, but also thin-walled broadly clavate cheilocystidia 16-36 x 8-16  $\mu\text{m}$  were observed, pleurocystidia 45-60 x 16-25  $\mu\text{m}$  and the somewhat oblong spores 9-12.5 x 5-7  $\mu\text{m}$  with blunt nodules. Pileus up to 2.5 cm, convex, slightly umbonate, pale brown (center brown) with radially arranged darker fibrils and thin scales. Stipe 4 x 0.15-0.25 cm, whitish in the upper part, becoming brownish toward the base, fibrillose.

\**Inocybe flocculosa* (Berk.) Sacc. var. *flocculosa*

Collected in May 2001 under *Abies* at a location between the Gardiki village and A2. Pileus up to 3.3 cm, convex to plano-convex, ocher-brown, radially fibrillose to appressed-squamose; lamellae broad, relatively distant, white when young, later pale brownish with white edge; stipe 3 x 0.3-0.5 cm, whitish when young, later reddish-brown, longitudinally fibrillose, apex pruinose to slightly hairy; spores 9-12.5 x 5.5-7  $\mu\text{m}$ , pleuro- and cheilocystidia sublageniform to lageniform, subfusiform to fusiform 40-75 x 10-17  $\mu\text{m}$  (walls up to 4  $\mu\text{m}$ ), caulocystidia on the upper part of the stipe similar but mixed downward and substituted to the lower 1/3-1/2 of the stipe with non crystalliferous polymorphic cauloparacystidia up to 110 x 13  $\mu\text{m}$  (walls up to 2  $\mu\text{m}$ ).

†*Inocybe fraudans* (Britzelm.) Sacc.

Collected in May 2001 (A2) under *Abies*. One previous report from conifers (Maire & Politis 1940) as *Inocybe piriadora* (Fr. ex Pers) Quél.

†*Inocybe geophylla* (Sowerby) P. Kumm. var. *geophylla*

Characteristic of this variety is the white, not reddening fruit-body and the white-grey lamellae, turning clay-buff when old. Spores 8.5-11 x 5-6.5  $\mu\text{m}$ ; cheilocystidia thick-walled (walls up to 2.5  $\mu\text{m}$ ), slender fusiform to lageniform or clavate, 55-65 x 11-14  $\mu\text{m}$  (among them also thin-walled clavate) pleurocystidia similar but broader, up to 19  $\mu\text{m}$  wide. Rare for

Greece, reported only once in the past (Maire & Politis 1940). Collected in November 2001 under *Abies* (A1S3).

\**Inocybe mixtilis* (Britzelm.) Sacc.

Collected at the end of May 2002 under *Abies*, among mosses (A1S2). This species is characterized macroscopically by the bright yellow-ocher, radially fibrillose pileus and the white, pruinose (because of the presence of caulocystidia) along the entire stipe length, with a bulbous-marginate base; microscopically is characterized by the nodulose spores measuring 6.5-10 x 5.5-7 µm and the ventricose to sublageniform, encrusted, thick-walled (up to 4 µm thick) cheilo- and pleurocystidia measuring 45-60 x 15-21 µm; caulocystidia sublageniform-lageniform up to 60 x 15 µm.

\**Inocybe nitidiuscula* (Britzelm.) Sacc.

Collected at the end of May 2002 from an *Abies* clearing (A1S2). Basidiomata characterized by pileus plano-convex, umbonate, measuring 1.7-5 cm, hazel-brown, radially fibrillose, and lamellae cream-beige; stipe 2.7-4.5 x 0.2-0.3 cm, light beige with reddish shade and pruinose apex, base white; spores 9.5-12.5 x 5.5-6.5 µm, cheilo- and pleurocystidia cylindrical-subfusiform to fusiform 40-65 x 9-17 µm (cystidia generally somewhat slender than those reported by Kuyper 1986, Hansen & Knudsen 1992, Breitenbach & Kränzlin 2000), often flexuose in the upper part like that of *I. obscuroidia* (J. Favre) Grund & D.E. Stuntz; caulocystidia, similar to the lamellar cystidia, cover the upper 1/3-1/2 of the stipe turning downward into hyphal elements with cystidioid terminal cells (sometimes encrusted), base with simple hyphal hairs. *I. tarda* Kühner and *I. friesii* Heim, treated sometimes as separate species (Moser 1983) are considered synonyms (Kuyper 1986, Breitenbach & Kränzlin 2000).

†*Inocybe rimosa* (Bull.) P. Kumm. var. *rimosa*

Collected at the end of October 1998 under *Abies* (A1S2). This species of the subgenus *Inosperma*, section *Rimosae*, is very variable in morphology and according to Kuyper (1986) four widely distributed variants can be recognized. Our collection presenting conical, ochraceous-brown pileus, lacking well-developed pileipellis and with stipe apex flocculose from catenate hairs bearing cheilocystidioid terminal elements, belongs to the variant D (conforming to *I. fastigiata*). Two previous reports of *I. fastigiata*, mainly on hardwoods (Maire & Politis 1940, Avtzis & Diamandis 1988).

\**Inocybe splendens* Rob. Heim var. *splendens*

Rare species, collected once at the beginning of November 2000 under intermixed *Abies-Quercus* trees (A3). Pileus 3.2-5.0 cm, campanulate to planoconvex, broadly umbonate, ocherish- to reddish-brown, surface radially fibrillose to scaly; lamellae beige, later olive-brownish, edge whitish; stipe 2.5-4.5 x 0.5-0.8 cm, cylindrical, concolorous, longitudinally striate; spores smooth, ellipsoid to subamygdliiform 8-11 x 5-6.5 µm; basidia 4-spored; cheilo- and pleurocystidia fusiform, subventricose, rarely clavate, 45-55 x 11-

16  $\mu\text{m}$ , very thick-walled (up to 5  $\mu\text{m}$ ) and encrusted, cheilocystidia thin-walled pyriform to clavate also present; caulocystidia similar to cheilocystidia (but less thick-walled) present along the total stipe length. The striate, pruinose along the entire its length stipe and the slender cystidia are characteristic of this Mediterranean taxon, although Kuyper (1986) did not quote such thick cystidial walls.

\**Inocybe splendens* var. *phaeoleuca* (Kühner) Kuyper

Recorded in October 1998 under *Abies* (A2). This species is easily recognized thanks to the bright rusty- to orange-brown color of the pileus. Pileus 1.5-3.5 cm, broadly campanulate to convex, or with an obtuse umbo, radially fibrillose; lamellae whitish-grey initially, then ocher-brown, finally rusty-brown; stipe 2-3.5 x 0.3-0.5 cm, cylindrical, solid, ocher-whitish to pale ocher-brown, gradually browning upwards; spores often conical apically (8-) 9-11 (-12) x 5-6 (-6.5)  $\mu\text{m}$ , cheilocystidia encrusted thick-walled cylindrical-subfusiform to sublageniform (25-) 40-50 x 9-10  $\mu\text{m}$  (among them also thin-walled, cylindrical to clavate), pleurocystidia similar to cheilocystidia 40-80 x 12-22  $\mu\text{m}$  (also rarely clavate or broadly ventricose); caulocystidia similar to pleurocystidia, abundant on the upper part but rare below the middle of the stipe.

\**Inocybe whitei* (Berk. & Broome) Sacc.

Collected in early November 2000 under intermixed *Abies-Castanea* trees (A1S2). Characteristic for this collection is the white basidiomata turning pink to salmon when bruised, cut or dried (pileus 3.5-6 cm, convex to plane with umbo, somewhat viscid), the smooth spores, 8-10(-11) x 5-6  $\mu\text{m}$ , and the fusiform, lageniform (rarely also ventricose) thick-walled and apically encrusted cheilo- and pleurocystidia (45-60 x 13-25  $\mu\text{m}$ ). Caulocystidia only on the upper part of the 4-8 x 0.8-1 cm stipe, mostly lageniform, often subcapitate and sometimes neck bearing digitate outgrowths, even diverticulate, 40-100 x 12-21  $\mu\text{m}$ .

†*Irpex lacteus* (Fr.) Fr.

Recorded at the end of August 2001 on the bark of a dead fallen trunk of *Robinia pseudoacacia* (A1S1). The irpicoid-lacerate hymenophore, the dimitic hyphal system, the clampless septa, the presence of encrusted skeletoid hyphae and the cylindrical-suballantoid spores measuring 4.5-7.0 X 2.0-3.0  $\mu\text{m}$ , confirm this identification. However, the basidiomata of this collection were resupinate even on vertical surface and only very few rudimentary (not exceeding 2 mm) pileal surfaces were formed. Moreover, the poroid habitus was inconspicuous because of the crowded, flattened, daedaleoid, long (up to 6 mm) teeth. The skeletoid hyphae were irregularly scanty, and rare simple septa were observed on them. According to Maas Geesteranus (1974) such features do not support species differentiation. Only one previous record in Greece on *Quercus frainetto* (Zervakis et al. 2002b).

***Laccaria amethystina*** Cooke

Relatively common in broad-leaved forests, but rare under conifers. Recorded once in October 1998 (A2).

†***Laccaria laccata*** (Scop.) Berk. & Broome var. ***pallidifolia*** (Peck) Peck

This is the only variety of this common species recorded in the investigated area, collected several times under *Abies* among mosses and on the needle litter (A1S2, A3), on bare soil under intermixed *Abies cephalonica* and *Quercus pubescens* trees between the Gardiki village and the site A2. It was also collected from the *Fagus* wood of the same mountain (Dimou et al. 2002), and although these are the only records from Greece, it is quite probable that many of the *L. laccata* reports concern this variety. *L. laccata* var. *laccata* Fr. is only once reported (Constantinidis 2002).

\****Lactarius leonis*** Kytöv.

Recorded under *Abies* almost every year in site (A2) and once (1998) in A1S2. This species is closely related to *L. scrobiculatus* (Scop.) Fr., but the pileus is not so intensively yellow, not zonate, pits are formed along the entire length of the stipe, and spores possessed thick, nearly reticulate, ornamentation. It is possible that some records of the latter species in Greece in fact were *L. leonis*.

***Lactarius salmonicolor*** R. Heim & Leclair

Common everywhere within the research area, under *Abies* pure or mixed with *Juniperus* stands. Reported only once in the past from an intermixed *Abies-Pinus* forest (Delivorias & Gonou-Zagou 2000b).

\****Lentaria epichnoa*** (Fr.) Corner

Collected at the end of November 2003 from the needle-litter of *Pinus nigra* (A1S5). This collection presented some difficulty in the identification because of the basidiomata habitus: pilei coralloid, cream, up to 2.8 cm high, branching irregularly at the apex 2-5 times, branches somewhat longitudinally furrowed with obtuse apex. The judging features confirming the identification were the clamped hyphae (not more than 10 µm in diameter) and the ellipsoid spores measuring 5-6.5 (-7) x 3.5-4 µm; basidia 4-spored. According to Hansen & Knudsen (1997), the correct name is *L. subcaulescens* (Rebent.) Rauschert.

†***Lentinellus micheneri*** (Berk. & M.A. Curtis) Pegler

Collected in August 2002 from the needle litter and buried decaying twigs of *Abies* (A1S2). Reported only once in the past on *Cistus* sp. (Polemis et al. 2002a).

†***Lepiota aspera*** (Pers.) Quél.

Recorded under *Abies cephalonica* in October 1998 (A2). A relatively rare species, only two previous records in intermixed *Abies* sp.-*Pinus* sp. stands (Maire & Politis 1940) and in *Fagus* forests (Diamandis & Perlerou 1994).

†*Lepiota clypeolaria* (Bull.) P. Kumm.

Collected in early November 2000 among ferns under *Juniperus oxycedrus* (A1S3) and under intermixed trees of *Abies cephalonica*, *Pinus nigra* and *Robinia pseudoacacia* (A1S1). Common in conifer and hardwood forests of Greece.

†*Lepiota cristata* (Bolt.) P. Kumm.

Collected at the end of August 2001 under *Abies cephalonica* (A1S1). Recorded in the coniferous and broad-leaved forests in Greece.

\**Lepiota echinacea* J.E. Lange

Collected in early November 2000 from the needle litter under *Abies cephalonica* (A1S2). A group of young light brown basidiomata (pilei almost closed, conical up to 1.1 cm but stipe broad up to 0.5 cm, indicating open pileus diameter of more than 2 cm). This rare species is characterized by the presence of almost concolorous conical-warty scales on the pileus and on the stipe below a woolly ring; spores 4-5.5 x 2.5-3 (-3.5), cystidia absent.

†*Lepista rickenii* Singer

One collection at the end of November 2003 under mixed stands of *Pinus nigra-Quercus frainetto* (A1S5). Reported once in the past from Kyklades isls (Polemis et al. 2002).

*Leucopaxillus gentianeus* (Quél.) Kotl.

One collection end of October 1999 under *Abies* (A3). Three previous reports (Maire & Politis 1940, Pantidou 1973, 1980, Athanasiou & Theochari 1999).

†*Leucogyrophana mollusca* (Fr.) Pouzar

Recorded in December 1999 on decomposed *Abies* stump (A1S2). The spores of this collection were measuring up to 7 x 5 µm, weakly dextrinoid. There is a confusion between this species and *L. pseudomollusca* (Parmasto) Parmasto. According to Eriksson & Ryvarden (1976) Fries' description of *Merulius molluscus* covers *L. pseudomollusca*, while *M. pseudomolluscus* Parmasto corresponds to *L. romellii* Ginns. Consequently, specimens with larger basidiomata remaining merulioid in dry state, with spores up to 7 µm long and moderately dextrinoid belong to *L. mollusca*, whereas those with thinner basidiomata which become less merulioid when dry and spores up to 5.5 (-6) µm belongs to *L. romellii* = *L. pseudomollusca* (Jülich 1984, Hansen & Knudsen 1997). Two previous reports in Greece (as *L. pseudomollusca*) from *Abies borisii-regis* (Diamandis & Perlerou 1990) and *Pinus* sp. Constantinidis 2002).

†*Limacella illinita* (Fr.) Murrill

Recorded once early in November 2003 under mixed stands of *Pinus nigra* and *Quercus frainetto* (A1S5). Relatively rare for Greece.

†*Lycoperdon umbrinum* Pers.

Recorded in October 1998 under *Abies* (A1S2). One previous record from conifers (Maire & Politis 1940).

***Lyophyllum fumosum*** (Pers.) P.D. Orton

Large basidiomata grown on charcoal from a burnt *Abies* stump were collected at the end of October 2002 (A3). This species was not until now known to be anthracophilous. Rare, reported only once in the past, in *Abies* forests as well (Zervakis et al. 2002a).

†***Lyophyllum semitale*** (Fr.) Kùchner

One collection at the end of October 1999 in the needle litter under *Abies* (A2). Rare species recorded only once in the past in *Pinus* (Pantidou 1990).

***Lyophyllum transforme*** (Britzelm.) Singer

Rare, recorded once at the end of October 1998 under *Abies* trees (A3). Only one more record (Zervakis et al. 2002a).

\****Macrolepiota prominens*** (Fr.) M.M. Moser

Recorded once under *Abies* in early October 1998 (A1S2). No reddening was noted in any part of the basidioma, similar in morphology to *M. procera* but without the adder-like pattern on the stipe and possessing smaller spores.

†***Marasmius oreades*** (Bolton) Fr.

Collected in May 2001 in a grassy clearing of the *Abies* forest, between the Gardiki village and A2. Recorded previously in various other habitats.

\****Melanoleuca bresadolae*** Singer

Collected in April 1999 around a sheepfold in the alpine zone (A1S4), among herbs, on soil rich in sheep manure. Characteristic of this species are the stocky stipe the somewhat caespitose habit and the fusiform cystidia. Pileus up to 7.5 cm initially irregularly convex with inrolled margin, brown, spotting paler and margin pale ochraceous-cream; lamellae cream becoming ocher-cream; stipe up to 3.5 x 2.2 cm, stiff, concolorous with the lamellae; spores verrucose 8-10 x 5-6(-6.5)  $\mu\text{m}$ , cystidia fusiform, non-septate, up to 70 x 12  $\mu\text{m}$ .

***Melanoleuca cognata*** var. *cognata* (Fr.) Konrad & Maubl.

Recorded at the end of April 1999 in *Abies* (A2). Two previous reports (Pantidou 1990, Zervakis et al. 2002a) in *Abies cephalonica* too.

\****Melanoleuca cognata*** (Fr.) Konrad & Maubl. var. *pallidipes* Kùchner

Collected in May 1998 around a sheepfold in the alpine zone (A1S4), among herbs, on soil rich in sheep manure. Pileus 9-13 cm, convex to planoconvex, often with obtuse umbo, ocher to reddish-brown; lamellae characteristically deep yellow-ocher; stipe 8-10 x 1.5-2 cm, base enlarged, initially cream, then central region pale yellow-ocher, longitudinally fibrillose-striate by pale brownish fibrils; spores finely verrucose (7.5-) 8-10 (-10.5)  $\mu\text{m}$ , cystidia non-to 2-septate, mostly fusiform, up to 60 x 15 (-17)  $\mu\text{m}$ .

\****Melanoleuca crassotunicata*** Singer

One collection in October 1998 under *Abies* (A2). Pileus 9 cm, plane pale brownish to ocher-beige, lamellae ocher-white, stipe 3.5 x 0.8 cm, concolorous to the pileus but base slightly deeper; spores 7.5-10 x 5-6  $\mu\text{m}$ ,

cystidia distant but projecting, fusiform 40-70 x 10-15  $\mu\text{m}$ , with thick walls at the apex (somewhat like in *Inocybe*), crystalliferous.

\**Melanoleuca excissa* (Fr.) Singer var. *excissa*

Collected in early November 2000 in a grassy clearing of the *Abies* wood (A1S3). The features of this collection fit best to the description of Boekhout (Bas et al. 1999). *M. kuehneri* Bon is possibly conspecific.

\**Melanoleuca favrei* Bon

Collected twice during autumn 2000 (13 October and 6 November) in an *Abies* forest clearing (A1S3) among grasses. Characteristic of this collection is the cespitose habit, the collybioid appearance; pileus convex with a long time incurved margin, whitish to pale beige-grey pileus, 1.8-5.5 cm in diameter; lamellae whitish; stipe 4-5.5 x 0.7-1.3 cm, slightly widened towards the top and with slightly enlarged base, white, longitudinally fibrillose, upper part finely flocculose; spores 7-11 x 5-6  $\mu\text{m}$ , cheilocystidia crystalliferous, slender fusiform 35-60 x 5-8  $\mu\text{m}$ , 1-, 2-septate, gradually attenuated toward the apex.

\**Melanoleuca grammopodia* (Bull.) Pat.

Collected at the end of October 1998 on an alpine pasture (A1S4), on soil rich in sheep dung. Pileus 11-12 cm grey-beige, wavy, center depressed, margin slightly incurved; lamellae whitish, adnate; stipe 9.5 x 2.5-1.7 (tapering to the base), tough, ocher, longitudinally striate; spores 8.5-10(-10.5) x 5.5-6  $\mu\text{m}$ ; cheilocystidia extremely rare, urticoid.

*Melanoleuca melaleuca* (Pers.) Murrill

This species was recorded in the intermixed *Fagus-Abies* area, and it was initially reported (Zervakis et al. 1998) as a *Fagus* associated fungus but it should be considered as related with *Abies*.

\**Melanoleuca pallidipes* (J.E. Lange) Bon

Collected in April 1999 under intermixed *Abies cephalonica*, *Quercus* sp. and *Castanea sativa* trees (A1S5). Pileus 5 cm in diameter, pale brown, planoconvex; lamellae whitish, notched; stipe slightly compressed, 3.5 x 0.8 x 0.5 cm, whitish, faintly browning towards the base, base somewhat bulbous; spores 7-9 x 4.5-6  $\mu\text{m}$ , cystidia scanty, fusiform, crystalliferous.

\**Melanoleuca polioleuca* (Fr.) Kühner & Maire f. *langei* Boekhout

The commonest *Melanoleuca* species in this region appearing mainly in the spring and occasionally in autumn under *Abies* on grassy ground. Pileus 4.5-9 cm planoconvex with a low umbo, cream- to yellowish-brown, greasy and subhygrophanous in moist weather, pale brown to pale grey (with green-olivaceous tint in dry weather); lamellae dense, thin, white; stipe 5-5.5 x 0.8-1.2, grey-whitish with enlarged base; spores 8.5-10 x 5-6  $\mu\text{m}$ , basidia (1-), 2-(-3, -4) spored, cystidia fusiform and lageniform 60-75(-80) x 12-15(-17)  $\mu\text{m}$ , subulate and crystalliferous. According to Boekhout this form differs from the other two (f. *polioleuca* and f. *fragillima*) only in the habitus (Bas et al. 1999).



\****Melanoleuca polioleuca*** (Fr.) Kühner & Maire f. ***polioleuca***

Collected in November 2000 under *Abies* in needle-litter (A1S3). Pileus 7.5 cm, plano-convex with a low umbo and margin somewhat incurved, grey-brown with olivaceous tint, pruinose in dry weather; lamellae white; stipe longer than the pileus diameter, 9 x 1 cm, cylindrical, longitudinally fibrillose, whitish with pale brown tint at the top; spores 7-10 x 5.5-6(-6.5); cystidia fusiform to sublageniform, 55-95 x 11-20 µm (extremely rarely 1-septate), subulate and crystalliferous. Bon (1991) upgraded this and the previous forms to species-level.

\****Melanoleuca politoinequalipes*** (Beguet) Bon

Collected in March 2001 around a sheep-fold, among herbs on soil rich in sheep dung, with scattered *Quercus frainetto* trees around (A1S5). Only one previous record (Zervakis et al. 2002b).

\****Melanoleuca queletii*** Bon

This collection, made in March 2002 under intermixed *Pinus nigra-Robinia pseudoacacia* (A1S5), represents a member of section *Alboflavidae*. Pileus 4-6.5 cm, plano-convex with umbo, whitish-cream with pale grey-brownish centre, slightly viscid when moist; lamellae whitish-cream, notched, forked and interveined; stipe 3-5.5 x 0.7-0.9, clavate (base up to 1.3 cm in diameter), fibrillose, concolorous; spores 7.5-9.5 x 5-6 µm, cystidia 45-65 x 8-13 µm, lageniform to fusiform, often with one septum (Bon 1991, septate cystidia are not cited). *M. nivea* Métrod ex Boekhout, which is the smallest of *Alboflavidae*, resembles morphologically this collection but it possesses no intervenose lamellae.

\****Melanoleuca substrictipes*** Kühner

Collected at the end of May 2002 from the alpine zone (A1S4), around the same sheepfold where *M. cognata* var. *cognata* and other mushrooms have been collected. This collection was characterized by pure white color, pileus undulating with margin incurved, 3.5-7.2 cm in diameter, stipe 3-7 x 1-1.6 cm; spores ellipsoid 8-10.5 x 5-6 (-6.5) µm, cheilo- and pleurocystidia subulate, 0-, 1-, 2-septate (the apex usually conical), some apically encrusted, 20-55 x 4-6 µm.

\****Mycena amicta*** (Fr.) Quél.

Recorded in October 2001 on *Abies*, deeply rooting into wood debris. This collection had the characteristics of section *Viscipelles*: cap 0.5-1.0 cm with grey-blue color towards the margin and pileipellis with an external gelatinous and peelable in patches layer; stipe long (5-11.5 x 0.07-0.12 cm) cream-beige at the apex, greying-bluing towards the base, pubescent; cheilocystidia cylindrical-clavate-subfusiform and spores amyloid, ellipsoid 6-10 x 4.5-5(6) µm.

\****Mycena epipterygia*** (Scop.) Gray var. ***epipterygioides*** (A. Pearson) Kühner  
Collected in October 2000 from the needle litter under *Pinus nigra* (A1S5). This variety is similar microscopically to *M. epipterygia* var. *viscosa*,

differing only macroscopically in having a greenish tint mixed with yellow, more intense in the pileus margin and on the stipe.

***Mycena epipterygia* var. *viscosa*** (Secr. ex Maire) Ricken

Recorded in December 1999, growing in clusters on the needle litter around the base of an *Abies* tree (A1S3). There are several varieties of *M. epipterygia*. This one is characterized by separable lamellar edges, cheilocystidia clavate to broadly clavate with digitiform outgrowths and pileipellis composed from erect, diverticulate hyphae in a gelatinous material; pileus campanulate to broadly conic, undulating-striate, 0.8-1.9 cm in diameter, cream-whitish spotted reddish-brown, stipe yellow gradually turns brownish toward the base, 6-7 x 0.2 cm; spores 8-11 x 4.5-7  $\mu\text{m}$ , basidia 4-spored.

***Mycena stipata*** Maas Geest.& Schwöbel

Recorded in October 1998, growing in clusters on decayed *Abies* stump (A2). Common in Greece on conifers, especially on *Abies*.

†***Mycoacia uda*** (Fr.) Donk

Two collections from the same place (A1S1), on fallen branch of *Platanus orientalis* (end of August 2001), and on dead twig of *Sambucus nigra* (end of August 2002). Easily recognizable species thanks to the yellow, spiny hymenophore which turns red in KOH. The very similar *Mycoaciella bispora* (Stalpers) J. Erikss. & Ryvarden is distinguished by its dimitic texture (Eriksson et al. 1978). Only one previous record on *Arbutus unedo* (Diamandis 1985).

\****Myxarium nucleatum*** (Schwein.) Wallr. f. ***nucleatum***

Collected at the end of November 2003 from decorticated, decomposing trunk of *Platanus orientalis* (A1S1). Basidiomata firstly hemispherical, then confluent, gelatinous, hyaline to milky; basidia sphaeropedunculate with basal clamp, 4-spored; spores cylindrical-subballantoid (8-)10-15 x (3.5-)4-5  $\mu\text{m}$ . The other form (*ampulligerum* Hauerslev) differs in having basal hyphae ampullately swollen near the septa (Hansen & Knudsen 1997).

***Panaeolus acuminatus*** (Schaeff.) Quél.

Recorded in April 1996 (Zervakis et al. 1998) on donkey dung in an *Abies* forest clearing (A1S2).

***Panaeolus semiovatus*** (Sowerby) S. Lundell & Nannf. var. *semiovatus*

Recorded once in April 1996 among herbs, on donkey dung, in the Gardiki village (Zervakis et al. 1998, as *Anellaria semiovata*). Rare species, reported once more in the past as *Agarico semiovato* (Sibthorp & Smith 1806-1845).

***Panaeolus sphinctrinus*** (Fr.) Quél.

Recorded in April 1996 on donkey dung in the Gardiki village. Rather common in the past but not often recorded any more (as well as the two preceding species) because of reduction of the equines in the Greek countryside.

***Panellus mitis*** (Pers.) Singer

Recorded in December 1999 on fallen branches of *Abies* (A1S2). Two previous reports (Diamandis & Minter 1981, Diamandis 1992).

\****Panellus violaceofulvus*** (Batsch) Singer

Collected in December 1999 on fallen twigs of *Abies cephalonica* (A1S2). Pileus up to 1.1 cm, purplish-violet; spores 6-8.5 x 2.5-3.5 µm. The similar *P. ringens* (Fr.) Romagn. occurs on hardwoods and has bigger pileus and shorter spores.

\****Peniophora nuda*** (Fr.) Bres.

Recorded at the end of August 2001 on dead branches of *Platanus orientalis* (A1S1). Our specimen (collected in dried condition) was characterized by pinkish-grey color with a violet tint, fissured surface (except the marginal zone), lamprocystidia conical in the hymenial layer, but mostly cylindrical in the subhymenial one, gloeocystidia up to 20 µm in diameter and spores cylindrical-suballantoid 8-10.5 x 3-3.5 µm. The similar-looking *P. violaceolivida* (Sommerf.) Massee, which occurs also on hardwoods, differs in having narrower gloeocystidia (mostly up to 10 µm) and spores somewhat smaller (7.5-9 x 3 µm), allantoid.

\****Peniophora rufomarginata*** (Pers.) Litsch.

This fungus was collected in March 2001 from a fallen branch of *Quercus frainetto* (A1S5). Basidioma resupinate, rolling off from the margin when dry, slightly tuberculate to ridged, rose-violaceous when fresh, margin somewhat paler; spores allantoid (6-)7-9.5 x 2.5-3.5; cystidia thick-walled, strongly encrusted, fusiform, cylindrical or clavate, 10-15 µm in diameter, imbedded in the hymenium or slightly projecting. This species is reported growing only on *Tilia* sp. (Eriksson et al. 1978, Jülich 1984, Breitenbach & Kränzlin 1986, Hansen & Knudsen 1997). Commonly growing on *Quercus* is the closely related *P. quercina* (Pers.) Cooke that is clearly distinguished microscopically by the longer spores (10-12 x 3-4 µm). This report seems to be the first on the occurrence of *P. rufomarginata* on a substrate other than *Tilia*.

\****Phanerochaete* cf. *jose-ferreirae*** (Reid) Reid

Recorded in April 1999 on a barkless branch of *Quercus frainetto* (A1S5). This collection was initially identified as *P. tuberculata* (P. Karst.) Parmasto, judging from the spore size (6-7 x 3-4 µm, few). Nevertheless the basidioma was smooth, cream-ocher (drying ocher-pale salmon) with white, abrupt, detaching margin and without rhizomorphs; hyphal system monomitic, hyphae thin- to thick-walled (in subhymenium and subiculum), encrusted in subiculum and completely lacking clamps; cystidia lacking. *P. tuberculata* was recorded previously on *Fagus sylvatica* (Dimou et al. 2002), and although it showed the same spore size as this collection, it differed both macroscopically (basidiomata tuberculate, margin fibrillose or with small rhizomorphs, firmly attached to substrate) and in the presence of scattered

clamps in the subiculum. The very few observed spores in the present collection would suggest an immature state and this was probably the reason for measuring shorter spores than those cited in literature: 7-9 (-11) x 2.3-3 (-3.5)  $\mu\text{m}$  (Hansen & Knudsen 1997, Eriksson et al. 1981).

†***Phellinus pini*** (Fr.) A. Ames

Recorded on *Abies cephalonica* in October 1997 (A1S2). Basidioma pileate, 10 x 6 x 5.5 cm, upper surface rugose-tuberculate with concentric zones, finely tomentose, grey-brown; pore surface pale brown, pores rounded, elongated, daedaloid 1-3/mm but some pores up to 2-3 mm wide; spores 5-7 x 4.5-5.5  $\mu\text{m}$ , non-dextrinoid, chlamydospores thick-walled, brown 5-7, setae brown, thick-walled, up to 21  $\mu\text{m}$  wide, subulate. According to Černý (1985), various European collections of *P. pini* correspond to the American species *Daedalea vorax* Harkness. Another species found in Europe on *Abies alba*, *Picea abies* and *Larix* sp. is *P. chrysoloma* (Fr.) Donk [= *P. pini* var. *abietis* (P. Karst.) Pilát]. Černý separated these species by spore size [*P. chrysoloma*: 4-5 x 3.5-4.5  $\mu\text{m}$ , *P. pini*: 6-7 (-8) x 4.5-6  $\mu\text{m}$ , *P. vorax*: 5-6 x 4-5  $\mu\text{m}$ ]. Probably this is the first record of *P. pini* on *Abies* for Europe.

†***Phellodon confluens*** (Pers.) Pouzar

Collected at the end of October 1999 on the limits of the *Fagus-Abies* forests (A2) but under *Abies* trees. One previous report from *Quercus* forest (Constantinidis 2002).

†***Phlebia radiata*** Fr.

Recorded in September 1999 on the base of a cut young *Abies* tree (A3). The basidioma was covering the bark, cracks and holes but it was also developing between the bark and the wood. This collection showed a cream color with some other spots, pink to pale orange, but bright colors were not present anywhere. Moreover, the spore size was somewhat different [i.e. broader: 4-5 x 2 (-2.5)]  $\mu\text{m}$  than this is given in the literature (Eriksson et al. 1981, Hansen & Knudsen 1997). Reported three times in the past (Heufler 1868 as *Corticium radiatum* Fr., Diamandis 1985 and Avtzis & Diamandis 1988 as *Phlebia merismoides* Fr.).

†***Phlebia rufa*** (Pers.) M.P. Christ.

One collection in October 2000 on the cut surface of a *Quercus* log (A1S2). Recorded previously on *Castanea* and *Fagus* (Maire & Politis 1940, Diamandis 1992, Dimou et al. 2002).

\****Pholiota heteroclita*** (Fr.) Quél.

Collected at the end of August 2002 on sawdust from *Quercus* wood, under intermixed *Abies-Quercus-Castanea* trees (A1S2). This collection is characterized by pileus up to 6.2 cm, yellow-ochraceous, slightly viscid with concentrically arranged, appressed brownish scales; lamellae pale grey-brown; stipe pale, scaly under the rudimentary annulus; spores ellipsoid 6.5-8.5 (-9.5) x 4-5  $\mu\text{m}$ , with germinating pore, cheilocystidia cylindrical to sublageniform 18-25 x 4-6  $\mu\text{m}$ ; chrysocystidia not seen.

†***Pholiota limonella*** (Peck) Sacc.

Collected in October 2000 from the soil but in contact with the base of a living *Abies* tree (A1S2). This collection is characterized microscopically by the spore size [6-8 x 4-5 (-5.5) µm] and by the presence of irregularly cylindrical to narrowly clavate cheiloleptocystidia and fusiform to sublageniform pleurochrysocystidia; pileus conical, later umbonate, viscid, appressed squamulose. Only one previous record on conifer wood (Zervakis et al. 2002a).

†***Pholiota squarrosa*** (Weigel) P. Kumm.

Recorded once in October 1995, growing in clusters high up on a standing dead trunk of *Abies* (A1S2). Recorded previously only on *Fagus* spp.

***Phyllotopsis nidulans*** (Pers.) Singer

Common in the investigated area, collected several times from decaying *Abies* stumps from mid-March to mid-May, and once in mid-December. Four previous records, three on *Abies* species and one on *Fagus*.

†***Pisolithus arrhizus*** (Pers.) Rauschert

One record in October 2001 in an *Abies* clearing. Some previous reports in dunes (Maire & Politis 1940), in *Pinus nigra* (Zervakis et al. 2002a) and in *Quercus* spp. (Zervakis et al. 2002b).

†***Pleurotus dryinus*** (Pers.) P. Kumm.

Recorded on the cross-section of an uprooted *Abies* stump. Recorded previously on *Fagus sylvatica* (Dimou et al. 2002) and on *Platanus orientalis* (Delivorias & Gonou-Zagou 2000a).

†***Pluteus atromarginatus*** (Konrad) Kühner

One collection in October 1998 on a decaying *Abies* stump (A1S2). The commonest *Pluteus* species in Greece after *P. cervinus* (Schaeff.) P. Kumm.

†***Pluteus plautus*** (Weinm.) Gillet

One collection (in a semi-dried condition), on *Abies* wood, in November 2000 (A1S2). This species is characterized by its thin-walled non-cornuted cystidia and the inflated short-clavate terminal cells of the hymeniform pileipellis. Pileus pale brown to ochre-brown (the pileus color varies from white to brown). One more record from Greece was made from the authors in the autumn of 2001 from the region of Naupactia on *Juniperus* sp. (Polemis et al. 2002b).

***Pluteus pouzarianus*** Singer

Collected in October 2000 (A1S3), April and May 2001 under *Abies* (A1S2). One previous report in *A. cephalonica* too (Zervakis et al. 2002a).

\****Pluteus primus*** Bonnard

Collected in May 2001 from decomposed *Abies* wood in a location between Gardiki village and A2, and in A1S1. This species is macroscopically similar to *P. cervinus* (Schäff.) P. Kumm. and *P. pouzarianus* Sing., but it differs microscopically in having clamps on all the septa of the pileipellis

(Breitenbach & Kränzlin 1995). In addition, this collection possessed clavate cheilocystidia and spores 7-9 X 5.5-6.5  $\mu\text{m}$ .

†*Pluteus salicinus* (Pers.) P. Kumm.

Recorded at the end of August 2001 on decomposed wood of *Platanus orientalis* (A1S1). One previous record on *Fagus sylvatica* in Greece (Dimou et al. 2002).

*Podofomes trogii* (Fr.) Pouzar

Collected at the end of August and in October 2001 under *Abies* (A1S2). One previous record (Zervakis et al. 2002a).

†*Polyporus arcularius* (Batsch) Fr.

One collection from *Platanus orientalis*, in March 2000 (A1S1). Several records on *Quercus* and *Fagus* in Greece.

*Postia fragilis* (Fr.) Jülich

Collected in September 1999 (Dimou et al. 2000) from the underside of a fallen-decaying *Abies* trunk (A3). Two additional records have been made from southern and northern Greece [Zervakis et al. 2002a as *Oligoporus fragilis* (Fr.) Gilb. & Ryvarden, Constantinidis 2002 as *Spongiporus fragilis* (Fr.) A. David].

\**Protodontia subgelatinosa* (P. Karst.) Pilát

A rare species, collected once in April 2000 from decayed *Abies* stump (A1S2). Basidioma odontoid, white, spines up to 1 mm long arising from thin subiculum, spores ellipsoid 6-8 (-8.5) x 4-5 (-5.5  $\mu\text{m}$  (sometimes with a lateral appendix), basidia stalked, longitudinally and cruciately septate, 9-11 x 7-9  $\mu\text{m}$ . We are not aware of any other literature reports from *Abies*.

†*Psathyrella conopilus* (Fr.) A. Pearson & Dennis

This collection was made in October 2000 under *Quercus* trees (A1S5). Recorded three times before in Greece (Maire & Politis 1940, Diamandis 1985, Dimou et al. 2002).

†*Ramaria botrytis* (Pers.) Ricken

Recorded under *Abies* in September 1999 and in November 2000 (A3). Only two previous reports under *Abies borisii-regis* (Diamandis & Perlerou 1990) and *Quercus*, *Fagus* (Constantinidis 2001, 2002), but we believe that this fungus is not rare in *A. cephalonica* forests.

*Ramaria fennica* (P. Karst.) Ricken var. *griseolilacina* Schild

Rare species, recorded once in this region in 1994 (S1A2) (Zervakis et al. 1998). Only one previous report in the same habitat (Pantidou 1973) (both reports under the name *Ramaria fumigata* (Peck) Corner).

*Ramaria largentii* Marr & D.E. Stuntz

One collection in April 2000 under *Abies* (A1S2). Reported once before (Zervakis et al 2002a).

*Ramaria obtusissima* (Peck) Corner

This yellow *Ramaria* with clamped hyphae and smooth spores has been collected twice, in October 1998 (A2) and in September 1999 (A3) under

*Abies*. Reported twice in the past (Perlerou & Diamandis 2000, Zervakis et al. 2002a).

\**Rhizopogon marchii* (Bres.) Zeller & C.W. Dodge

Two collections in October 2000 and November 2004 under *Pinus nigra* mixed with *Robinia pseudoacacia* or with *Juniperus oxycedrus* (A1S5). Characteristic for these collections is the absence of rhizomorphs except near the base of basidioma, the smooth surface, the *Abietis* type structure of the peridium (Martin 1996) and the spore volume ranging 42-76  $\mu\text{m}^3$  (Montecchi & Sarasini 2000). Spores 7-10 x 3.2-4  $\mu\text{m}$  (Q: 2.2-3) cylindrical to ellipsoid.

†*Rhodollybia butyracea* (Bull.) Lennox

Recorded under mixed *Pinus nigra-Robinia pseudoacacia* in October 1998 (A1S5) and under *Abies* at the end of November 2003 (A1S2). Rather common, mainly in broadleaved forests of Greece.

†*Rickenella fibula* (Bull.) Raithehl.

Under *Abies*, growing among mosses in May 2002 (A1S2). Previous records in forests of *Fagus* and *Pinus*.

*Russula adulterina* Fr.

Two collections made under *Abies* in October 1999 (A2) and August 2002 (A1S2). Pileus 5.5-12.5, initially convex, then plano-convex with centre depressed and margin somewhat striate, brown, violet-brown to olive-, ocher-brown, fading sometimes in the centre and in old specimens in the peripheral zone to cream-ocher; lamellae somewhat distant, thick, fragile, cream to ocherish; stipe robust 4.5-10.5 x 1.8-4 cm, cylindrical to clavate, white; taste acrid in young specimens, acrid after some seconds in the old ones; spores 9-13 x 7-11  $\mu\text{m}$  with spines isolated and long (up to 2  $\mu\text{m}$ ), spore-print yellow-ocher; dermatocystidia mostly clavate, septate. Only one previous record (Delivorias & Gonou-Zagou 2000).

†*Russula albonigra* (Krombh.) Fr.

Recorded at the end of August 2002, growing in groups under *Abies* (A1S2). Only two previous reports from south Greece (Peloponnisos) in *Castanea* sp. (Maire & Politis 1940) and *Quercus frainetto* (Zervakis et al. 2002b).

\**Russula anthracina* Romagn. var. *insipida* Romagn.

A rare species, collected once in October 1998 under *Abies* (A2). Easily recognizable due to the rapid blackening of the flesh. This variety is characterized by the mild taste of lamellae (Moser 1983).

†*Russula chloroides* (Krombh.) Bres.

Collected in early November 1998, in August 2001 (A1S2) and August 2002 (A3), under *Abies*. Two previous reports from *Quercus* spp. (Zervakis et al. 1998, Zervakis et al. 2002b).

\**Russula emetica* (Schaeff.) Pers. var. *silvestris* Singer

Collected in August 2002 under *Abies* (A1S2). Pileus up to 5.4 cm, convex to plane, scarlet red with discolored ocher areas; lamellae whitish, relatively dense; stipe up to 5.5 x 2.5 cm, clavate to subventricose, white; flesh white,

taste burning; spores 6-8 x 4.5-6  $\mu\text{m}$ , mostly isolated warty, warts about 0.5  $\mu\text{m}$ , spore-print white; dermatocystidia irregularly cylindrical, aseptate to rarely monoseptate.

\**Russula firmula* (Jul.) Schäff.

Collected in October 1998 under *Abies* (A2). Pileus 4-6 cm in diameter, convex, then depressed, purple to violet, spotted olivaceous especially in the center; lamellae yellow-ochre; stipe 2.5-4.5 x 1.2-1.7 cm, white, base somewhat ochre; spores subglobose 8-11 x 7-8.5  $\mu\text{m}$ , strongly echinulate with isolated spines; spore-print yellow-ochre.

\**Russula galochroa* (Fr.) Fr.

Collected at the end of August 2001, under intermixed *Abies cephalonica*-*Castanea sativa* trees (A1S2). Pileus 7.5 cm, cream-whitish without any trace of green or violet, dirty yellow-brownish spotting, convex with center depressed dirty and margin somewhat rugose, slightly sulcate. Lamellae cream, narrow, dense, adnate, forking near the stipe. Stipe white, sometimes also spotted, irregularly cylindrical, 5 x 2 cm, tapering in the base. No greenish tint on lamellae or on stipe. Spore print very pale, spores 7-9 X 6-7  $\mu\text{m}$  with short, isolated spines. Flesh white, odor fruity, taste mild. This collection fits the descriptions in Moser (1983) and Hansen & Knudsen (1992). The habit of our collection resembles much *R. galochroides* Sarnari, but the latter possesses spores reticulate and somewhat different pileipellis structure. On the other hand, in Sarnari's description of *R. galochroa* the pileus and spore dimensions are slightly smaller.

†*Russula heterophylla* (Fr.) Fr.

Collected at the end of October 1998, from an *Abies* clearing (A1S3). Characteristic of this collection are the pileus cuticle structure (covering the pileus to the margin) and the presence of comma-shaped spores among the normal ellipsoid (spores 6-8 x 5-6  $\mu\text{m}$ , with isolated warts). Pileus greenish-yellow to ocher-brownish. One record previously under *Quercus* sp. (Diamandis 1992).

\**Russula hortensis* Sarnari

One collection at the end of August 2002 under *Abies* trees (A1S2). Pileus 4.5-7 cm, initially convex, later plane with depressed center, margin initially smooth but later sulcate and sometimes split, surface viscid to glutinous, rusty-sienna in the center, paler to pinkish-cream towards the margin; lamellae cream-whitish, spore-print pale cream; stipe up to 5 x 2 cm, slightly clavate, whitish with a faint dirty tint; spores strongly warty, warts up to 1  $\mu\text{m}$  high with fine connections; taste mild, smell faint fishy. Sarnari (1998) reported that this species occurs in gardens and parks in Italy. The closely related *R. praetervisa* Sarnari, occurring in coniferous and broadleaved woods, differs in having an unpleasant and sometimes bitterish taste, odor more distinct, often rusty-brown spots on the pileus and purplish-red spots on the stipe base.



\**Russula mustelina* Fr.

Collected at the end of August 2002, under *Abies* (A1S2). Characteristic of this species are the ochre-, hazel- to red-brown (with cream patches) pileus colors, the narrow, crowded, forked and anastomosing lamellae, and the absence of dermatocystidia. Pileus 7-11.3 cm; stipe 4-5.5 x 1.8-3.6 cm, whitish; spores 7-8.5 x 6-7  $\mu\text{m}$ , verrucose, netted; spore-print cream; flesh white, taste mild.

\**Russula nauseosa* (Pers.) Fr.

Collected in July 2001 under intermixed *Abies-Castanea* trees (A1S2). Pileus 6.8 cm, depressed and undulate, yellow-ocher but buff to beige spotted, margin with faint purple shine; lamellae cream-yellow, thick and broad, distant, strongly intervenose; stipe cylindrical, 3.5 x 2 cm, white; spores ellipsoid 8-12 x 7.5-10  $\mu\text{m}$ , with isolated spines up to 1.5  $\mu\text{m}$  long; cheilo- and pleurocystidia clavate to fusiform (but not sharp-ended) usually with a thin outgrowth; dermatocystidia similar, sometimes constricted, 0-2 septate. Species very variable in color.

†*Russula olivacea* (Schaeff.) Fr.

Two collections under *Abies* at the end of August 2002 (A1S2). Both presented the characteristic phenol reaction on the flesh which turns wine-red to grey-pink. Pileus 8-11.5 cm, plano-convex, center depressed, violaceous-purple, near margin brownish-purple, sometimes center or patches ochre-olivaceous; lamellae broad, initially cream, later yellow-ocher; stipe 6-7 x 1.7-3 cm, white or with pink tint; taste mild; spores 10-12 x 8-10  $\mu\text{m}$  with long isolated spines, spore-print pale ochre. *R. alutacea* (Pers.) Fr. is a similar-looking species, but it possesses smaller spores with a partial reticulum. Recorded previously in *Fagus* and *Quercus* forests.

\**Russula olivina* Ruots. & Vauras

Collected in December 1999, under *Abies* (A1S2). Pileus 5.5-7.5 cm, applanate with slightly depressed center, greenish-yellow, margin greenish with faint lilac shine; lamellae yellow with a faint green tint; stipe cylindrical 4.5-8 x 1.7-2.8 cm, white, longitudinally striate; taste mild; spores broadly ellipsoid (7.5-)8- 10.5(-11) x (6-)6.5- 9(-9.5)  $\mu\text{m}$  with  $\pm$  isolated warts and few connections, spore-print ochre; basidia 2-, 4-spored (predominantly 4-spored); pileipellis without dermatocystidia but with slender primordial hyphae minutely incrustated and some intermixed clavate terminal cells. The close *R. postiana* Romell differs only in having 4-spored basidia (Hansen & Knudsen 1992).

*Russula pallidospora* J. Blum ex Romagn.

Recorded under *Abies* in early November 1998 (A1S2). This collection was similar to *R. delica*, but it possesses a longer stipe (8 x 4.8 cm), cream to deep ivory narrower lamellae, smell constantly fruity, spores 9-11.5(-12) x 8-10  $\mu\text{m}$ , spines interconnected. Only one previous record (Zervakis et al. 2002a).

\**Russula sphagnophila* Kauffman

Collected end of August 2002 (A1S2). This species, as the name indicates, grows in *Sphagnum* bogs associated with deciduous trees (especially *Betula*). Nevertheless, we recorded it in the needle litter of the *Abies* forest. The macroscopic and microscopic features of this collection were typical: Basidioma fragile, pileus 4.2-6.5 cm depressed at center, pale vinaceous, center pale greenish, margin sulcate; lamellae relatively distant ochre-whitish, spore-print cream-ocher; stipe 4.5-6.7 x 0.8-1 cm enlarged towards the base (up to 1.6 cm), white, hollow; spores 7.5-10 x 7-8  $\mu\text{m}$  with spines up to 1  $\mu\text{m}$  high, often interconnected; dermatocystidia conspicuous, multiseptate, up to 10  $\mu\text{m}$  in diameter; flesh white, taste mild.

\* *Russula subfoetens* W.G. Smith var. *grata* (Britzelm.) Romagn.

Recorded in August 2002 in *Abies* forest (A3). Pileus 6-12.5 cm in diameter, viscid, convex then applanate with depressed center, margin tuberculate sulcate, ochre to ochre-brown (often brown spotted) with darker center; gills whitish, distant, intervenose and forked near the stipe; stipe abnormally cylindrical to flattened, tapering to the base, 4.5-10 x 1.5-3.5 (-4.5)  $\mu\text{m}$ , whitish sometimes brown spotted; flesh pale, turning gold-yellow with KOH, taste mild; spores ellipsoid to broadly ellipsoid 7.5-9.5 X 6-7.5  $\mu\text{m}$  with warts shorter than 1  $\mu\text{m}$ , isolated or partly ridged. The typical *R. subfoetens* differs in having acrid taste. *Russula foetens* Pers. is similar-looking but it possesses flesh not changing in KOH, very acrid, smell strong and fetid, and spores with spines up to 1.5  $\mu\text{m}$  long.

†*Russula virescens* (Schaeff.) Fr.

Collected at the end of August 2002 on mossy soil under intermixed *Abies* and *Quercus* trees (A3) as well as under *Abies* on mossy soil and among ferns (A1S2). Two previous reports from *Fagus* and *Quercus* forests (Diamandis 1992, Constantinidis 1994).

*Russula xerampelina* (Schaeff.) Fr.

Collected at the end of August 2003 under *Abies* (A1S2). Recorded twice in the past, in *Fagus sylvatica* (Maire & Politis) and in intermixed *Abies cephalonica*-*Pinus nigra* forest (Zervakis et al. 2002a)

*Sarcodon leucopus* (Pers.) Maas Geest. & Nannf.

Recorded repeatedly under *Abies* from the end of August to early November, every year in the site A3 and once (October 1998) in the site A2. Two previous records (Maire & Politis 1940, Zervakis et al. 2002b).

\**Schizopora flavipora* (Berk. & M.A. Curtis ex Cooke) Ryvarden

Collected in March 2000 from a barkless branch of *Quercus frainetto* (A1S5). Basidioma resupinate, ocher (found in dried condition), pores 3-5/mm, spores 4-5 x 3-3.5  $\mu\text{m}$ . Differing from the following species in the color, pore diameter and spore dimensions.

†*Schizopora paradoxa* (Schrad.) Donk

Collected once in April 2001 from rotten *Abies* wood (A1S2). Rare on conifers. Previous reports in Greece from broadleaved trees.

†*Scleroderma bovista* Fr.

Collected once in October 2002 under *Abies* intermixed with *Quercus coccifera* (A3). Few reports from Greece (Heufler 1868, Diamandis 1992, Zervakis et al. 2002b).

†*Scleroderma polyrhizum* (J.F. Gmel.) Pers.

Recorded at the end of October (A3) and in December (A1S3) 1999, growing in groups in clearings of the *Abies* forest on sheep-manured ground.

*Sebacina grisea* (Pers.) (Pers.) Bres.

This species, recorded in March 2000 on the bark of dead *Abies* branch (between A1 and A2) (Dimou et al. 2000). Basidioma resupinate, waxy, whitish with bluish-steel tint, grey when dried; basidia subglobose to ovoid 10-15 x 8-11, spores allantoid 8-14 x 3-5.5 µm, forming sometimes secondary conidia.

*Setulipes androsaceus* (L.) Antonin

Rather common on cones, needles and wood remains of *Pinus nigra* (A1S5).

\**Steccherinum oreophilum* Lindsey & Gilb.

Collected from decomposing *Abies* wood in April 1999 (A1S2). Basidioma resupinate, ocher-white to cream colored, hymenium subirpicooid, aculei branched-coralloid; hyphal system dimitic, generative hyphae with clamps; spores ellipsoid 4-6 x 3 µm, lamprocystidia abundant, mostly subulate, encrusted part 50-100 µm long. Reported to grow only on hardwoods (Eriksson et al. 1984, Hansen & Knudsen 1997). The similar-looking *S. queletii* (Bourdot & Galzin) Hallenb. & Hjortstam occurring on coniferous wood produces odontoid basidiomata, somewhat broader spores (up to 3.5 µm) and the encrusted part of the lamprocystidia does not exceed 50 µm.

†*Stereum hirsutum* (Willd.) Gray

On dead fallen twigs of *Pinus nigra* in April 1999 (A1S5), on *Platanus orientalis* (in March 2000, A1S1) and on *Abies cephalonica* (in June 2003, A1S2). Very common on broad-leaved trees, but rare on conifers (only one previous report on *Abies borisii-regis*, Minter 1988).

*Stereum ochraceoflavum* (Schwein.) Ellis

Recorded on *Quercus frainetto* twigs in April 1999. Not very common in Greece.

*Stereum rugosum* (Pers.) Fr.

Recorded in March 2001 together with and next to *Peniophora rufomarginata* on the same *Quercus frainetto* branch. Other records on *Q. frainetto* (Maire & Politis 1940, Diamandis 1992) and on *Fagus sylvatica* (Zervakis et al. 1998).

†*Stereum subtomentosum* Pouzar

Recorded on dead fallen trunk of *Abies* in November 1996 (A1S2). Reported previously from *Fagus sylvatica* (Dimou et al. 2000, 2002, Constantinidis 2002).

*Strobilurus stephanocystis* (Kühner & Romagn. ex Hora) Singer

It appears regularly every year early in the spring together with *S. tenacellus* on *Pinus nigra* cones (A1S5). Although there are only two previous reports in Greece (Zervakis et al 2002a, Constantinidis 2002) this species should not be considered as rare for Greece.

*Stropharia aeruginosa* (M.A. Curtis) Quéf.

A common species in Greece but recorded only twice in the investigated area under *Abies* in October 1995 (A1S2) and 2002 (A3).

†*Stropharia caerulea* Kreisel

Recorded in November 2000 under ferns in an intermixed *Abies-Juniperus* area (A1S3) on the limit with the alpine zone. A rare species differing from *S. aeruginosa* in possessing marginal cheilochrysocystidia. One record previously in the *Fagus* forest of this mountain (Dimou et al. 2002).

\**Suillus leptopus* (Pers.) A. Marchand f. *littoralis* Bouchet

Collected in early November 2000 under intermixed *Pinus nigra-Abies cephalonica-Robinia pseudoacacia* trees (A1S1). This collection is characterized by the spore size 8-12(-14) x 3.5-5(-6) the large, hexagonal pores near the stipe and the long, tapering stipe. Pileus 7-7.5 cm, tubes yellow, stipe 4-7 x 0.7-1 cm (the normal form is short- and thick-stiped; Moser 1983). It was known to occur in coastal areas only.

†*Thelephora caryophyllea* (Schaeff.) Fr.

It is recorded every autumn in mossy stands and on needle litter under *Abies* only in one location (A3). Easily recognizable species thanks to the characteristic form of the basidiomata resembling the flowers of Chinese Pink. Reported previously from *Pinus* sp. and intermixed *Quercus-Abies* forests (Constantinidis 2002).

\**Tomentella atramentaria* Rostr.

Collected in March 2000 from almost bare soil in an *Abies* clearing (A2). Basidioma blackish; mycelial cords absent, hyphae clamped, subhymenial hyphae partly blue-green in KOH; spores 7-12 x 7-10, subglobose-ellipsoid, often with one side depressed, echinulate, pale brown in KOH, basidia up to 13 µm in diameter. In Hansen & Knudsen (1997), this species is reported to form hyphal cords, while according to Kõljalg (1996) it does not.

†*Trametes hirsuta* (Wulfen) Pilát

Recorded once during the autumn 1995 on fallen *Abies* trunk. All the previous records in Greece were on broadleaved trees and only one on *Pinus nigra* (Minter 1988).

†***Trametes versicolor*** (L.) Pilát

Recorded on dead *Abies* wood (rare on conifers) and on decorticated fallen trunk *Platanus orientalis* (A1S1). The latter collection, presented strongly constricted and elongated, stipe-like base (“stipe” tomentose arising from a disc-like stroma) or campanulate pilei on the trunk underside.

***Tremiscus helvelloides*** (DC.) Donk

Collected once in October 1998 (A2) on bare soil, under *Abies*. In Greece, it is recorded exclusively in *Abies* forests.

***Trichaptum fuscoviolaceum*** (Ehrenb.) Ryvarden

Collected once in April 1999 on dead fallen twigs of *Pinus nigra* (A1S5). Three previous records in Greece on the same host.

†***Tricholoma equestre*** (L.) P. Kumm.

Recorded at the end of October 1998 and of September 1999 (A2), in early November 2000 and 2003 (A3) under *Abies* trees, in mossy stands. One recorded previously under *Pinus nigra* (Maire & Politis 1940).

†***Tricholoma fracticum*** (Britzelm.) Kreisel

Recorded in November 2000, in small clearings of the *Abies* wood among ferns, and on forest roadsides (A1S2, A3 respectively). Reported once previously from *Pinus nigra* (Athanasίου & Theohari 1999).

†***Tricholoma gausapatum*** (Fr.) Quél.

Collected in mid-December 1999 in mosses, under *Abies* (A1S2). This species is very closely related to *T. terreum* (Schaeff.) P. Kumm. and to *T. myomyces* (Pers.) J.E. Lange. The differentiation is based on the cutis structure (criterion of Jossierand, CJ). This collection had CJ<sup>++</sup>. Spores 6-8.5 x 4.5-6 µm. Pileus radially fibrillose, dark grey but margin pale. One previous report from an intermixed *Pinus nigra-Quercus* sp. forest (Athanasίου & Theohari 1999).

***Tricholoma orirubens*** Quél.

Recorded at the end of October 1999 (A3) under *Abies*. Two previous records from Greece (Maire & Politis 1940 in *Abies* and *Pinus*, Constantinidis 2002 in *Quercus*).

†***Tricholoma sejunctum*** (Sowerby) Quél.

One collection at the end of November 2003 under *Pinus nigra* (A1S5). Recorded once in the past in *Fagus* forest (Diamandis & Perlerou 1990).

***Tricholoma squarrulosum*** Bres.

Collected at the end of November 2003 under *Abies* (A1S2). A typical Mediterranean taxon, common in Greece. It is closely related to *T. atrosquamosum*, but with stipe stockier and squamose, lamellar edges more black-punctate and slightly smaller spores.

***Tricholoma sulphurescens*** Bres.

Collected once at the end of October 1999 under *Abies* (A3). Recorded only once in the past (Pantidou 1980).

\**Tricholoma triste* (Scop.) Quél.

Collected in November 2000 under *Abies*, in mossy stands (A3). This species (belonging in the group around *T. terreum*) is characterized by the grey-sooty, scaly pileus and the white stipe, finely striate from the cortina traces in the upper half and sooty scaly in the lower half. Spores 5-6 x 4 µm, cheilocystidia indistinct.

†*Tricholoma ustaloides* Romagn.

Collected at the end of November 2003 under *Juniperus oxycedrus* intermixed with *Quercus frainetto* (A1S5). One previous report from *Quercus frainetto* (Diamandis & Perlerou 1994).

†*Vesiculomyces citrinus* (Pers.) Hagström

Collected from dead fallen *Abies* branches in October 1999 and in November 2000 (A1S2). Recorded once in the past on *Juniperus* sp. (Minter 1988).

†*Volvariella gloiocephala* (DC.) Boekhout & Enderle

Collected at the end of October 1998 in the alpine zone (A1S4) around the same sheepfold where also *Melanoleuca cognata* var. *cognata* was collected.

†*Xerocomus porosporus* Imler

This collection, made in October 1999 under intermixed trees of *Platanus orientalis*, *Alnus glutinosa* and *Abies cephalonica* (S1), is characterized, as well as the collections made in the adjacent *Fagus* forest (Dimou et al. 2002), by spores broader [6-8 (-9) µm broad] than that reported (4-6.5 µm) in the literature (Moser 1983, Hansen & Knudsen 1992 etc.). Two previous records (Pantidou 1980 in *Abies cephalonica*, Dimou et al. 2002 in *Fagus sylvatica*).

Other common in Greece basidiomycetes recorded in this area are (host/habitat/substrate is reported when other than pure *Abies*):

*Agaricus silvicola* (Vittad.) Peck, on the limits of the mixed forest *Fagus-Abies* (A2), *Agrocybe cylindracea* (DC.) Maire, October 2003 in the Gardiki village, on dead fallen trunk of *Populus* sp., *Amanita caesarea* (Scop.) Pers., from August to early October, (A1S2, A3), but also in mixed *Abies-Quercus* (A3), and in a *Castanea sativa* orchard (A1S1), from the middle of August to the middle of October, *Amanita citrina* (Schaeff.) Pers., September (A2), *Amanita muscaria* (L.) Hook., *Amanita pantherina* (D.C.) Krombh. and *Amanita rubescens* (Pers.) Gray, from August to September under mixed *Abies cephalonica-Quercus* sp. trees (A3), *Armillaria mellea* (Vahl) P. Kumm., October (A1S2), *Auricularia auricula-judae* (Fr.) Schröt., April (A1S2) and on fallen rotting trunk of *Juglans regia* in the Gardiki village (April), *Boletus calopus* Pers., August 2002 (A3), *Boletus edulis* Bull., under mixed *Abies-Castanea* (A1S2), *Abies-Pinus* (A3) and *Juniperus-Abies* (A1S3) from September to November, *Boletus luridiformis* Rostk. from April to November (A1S2, A1S3, A2), *Calocera viscosa* (Pers.) Fr., October-November (A1S2, A2, A3), *Cantharellus cibarius* Fr., in spring and autumn

(A1S3), and under mixed *Abies-Quercus* (A3), *Chalciporus piperatus* (Bull.) Bataille, October-November, *Chroogomphus rutilus* (Schaeff.) O.K. Miller, under *Pinus nigra* (A1S5), *Clavariadelphus truncatus* (Quél.) Donk., from September to November (everywhere but mainly in A2), *Clavulina rugosa* (Bull.) J. Schröt., from October to November (A1S3), *Clitocybe odora* (Bull.) P. Kumm., September-October (A1S2), *Coprinus comatus* (O.F. Müll.) Gray, along the roadsides, *Cystoderma granulorum* (Batsch) Fayod, October-November (A1S2, A2), *Fomitopsis pinicola* (Sw.) P. Karst., fresh basidiomata appear from March to June (A1S2), *Galerina marginata* (Batsch) Kühner, December on very rotten stumps (A1S2), *Ganoderma adpersum* (Schulzer) Donk, *Ganoderma carnosum* Pat., *Gloeophyllum abietinum* (Bull.) P. Karst., March (between A1 and A2), *Gloeophyllum sepiarium* (Wulfen) P. Karst., spring and autumn (A1S2, A3), *Gomphidius glutinosus* (Schaeff.) Fr., from September to November under intermixed trees of *Abies* and *Pinus* (A1S1), *Handkea utrififormis* (Bull.) Kreisel, along roadsides and in the alpine zone, *Heterobasidion annosum* (Fr.) Bref., *Hydnum repandum* L., October-December (A1S2, A2), *Hygrocybe conica* (Schaeff.) P. Kumm. var. *conica*, October to November under intermixed *Abies-Platanus* trees (A1S1), *Abies* (A2), along a roadside near *Juniperus oxycedrus* stands (A1S5) and among herbs in a clearing of the *Abies* forest (A1S2), *Hygrocybe persistens* (Britzelm.) Britzelm., August-September on the margins of an *Abies* forest clearing (A2), *Hygrophorus chrysodon* (Batsch) Fr., October-December everywhere but one collection at the end of November 2003 comprised from unusually large basidiomata (pileus up to 10.5 cm, stipe up to 8 x 1.9 cm), *Hygrophorus pudorinus* (Fr.) Fr., October to November (A1S2), *Hypholoma fasciculare* (Huds.) P. Kumm., October-November (A1S2), *Inocybe geophylla* var. *lilacina* (Peck) Gill., October-December under *Abies* as well as under intermixed *Abies-Quercus* trees (A1S2, A1S3, A3), *Ischnoderma benzoinum* (Wahlenb.) P. Karst., March-April (A1S2), *Lactarius deliciosus* (L.) Gray, everywhere within the research area during autumn, *Lactarius scrobiculatus* (Scop.) Fr., October (A1S2), *Laetiporus sulphureus* (Bull.) Murrill, from the end of August to November on *Castanea sativa* (A1S5), *Lentinellus castoreus* (Fr.) Kühner & Maire, October (A1S2), *Lepista nuda* (Bull.) Cooke, from October to the mid-December (A1S2, A2, A3), *Lepista sordida* (Fr.) Singer, October (A2), *Leucoagaricus leucothites* (Vittad.) Wasser, October (A1S2), *Lycoperdon perlatum* Pers., under *Abies* and *Pinus nigra* (A1S5), *Macrolepiota mastoidea* (Fr.) Singer, October (A2), *Macrolepiota procera* (Scop.) Singer, September-November in all areas forayed, mainly around sheepfolds, *Mycena pura* (Pers.) Sacc., under *Abies* and *Pinus*, pure or intermixed with *Quercus* spp. (A1S2, A1S5, A2, and A3), *Oligoporus caesius* (Schrad.) Gilb. & Ryvar den, October (A2), *Phellodon niger* (Fr.) P. Karst., October-November (A1S1, A3), *Pleurotus ostreatus* (Jacq.) P. Kumm., October-

December (A1S2), *Pseudoclitocybe cyathiformis* (Bull.) Singer, November (A1S2), *Radulomyces confluens* (Fr.) M.P. Christ. early May (between A1 and A2), *Ramaria aurea* (Schaeff.) Quél., (A1S3), *Russula delica* Fr. autumn (A1S2), *Russula rosea* Pers., August-September (A1S2), *Schizophyllum commune* Fr., autumn (A1S1), *Strobilurus tenacellus* (Pers.) Singer, March to April on cones of *Pinus nigra* (A1S5), *Suillus granulatus* (L.) Roussel, end of August to November under *Pinus nigra* pure or intermixed with *Abies*, *Quercus frainetto*, *Robinia pseudoacacia* (A1S5, A1S1, A3), *Suillus luteus* (L.) Gray, November (A3) and under intermixed trees *Abies-Pinus nigra* (A1S1), *Tremella mesenterica* Retz., April 1999 on twigs of *Pinus nigra* (A1S5), *Trichaptum abietinum* (Dicks.) Ryvarden autumn everywhere, *Tricholoma atosquamosum* (Chevall.) Sacc., October to November (A1S2, A2, A3), *Tricholoma aurantium* (Schaeff.) Ricken, October everywhere, *Tricholoma saponaceum* (Fr.) P. Kumm., under *Abies* pure or intermixed with *Quercus* (A1, A2, A3) *Tricholoma terreum* (Schaeff.) P. Kumm., usually during October, in all the areas forayed, *Xerocomus chrysenteron* (Bull.) Quél., May, October-November in all the sites forayed but not abundant, *Xerula melanotricha* Dörfelt, October to December *Pinus nigra* (A1S5), and *Abies* on soil and on decayed stumps (A1S2).

### Discussion

During this 9-year systematic investigation of the *Abies cephalonica* vegetation zone of Oxya Mt. (central Greece), including areas where fir is mixed with other tree species, 358 species and varieties of macrofungi were identified, among which 23 were Ascomycetes and 335 were Basidiomycetes, belonging in 149 genera. Ninety eight taxa constitute new records for Greece and 92 of them are presented here for the first time. This high percentage of new records is indicative of the still much unexplored macromycete wealth and of the effectiveness of the author's methodology studying an ecosystem on a regular basis during the whole year and for a succession of several years. Among the main results is the recording of five new genera for Greece (*Athelopsis*, *Crustoderma*, *Lentaria*, *Protodontia* and *Urnula*) and of some species, which are considered rare throughout Europe.

The following taxa are new to Greece: *Agaricus impudicus*, *A. langei*, *Agrocybe pediaties* f. *cintula*, *Amanita spissa*, *Antrrodia juniperina*, *Athelopsis subinconspicua*, *Boletus fechtneri*, *Ceriporia viridans*, *Chalciporus hypochryseus*, *Clitocybe amarescens*, *C. subsinopica*, *Coltricia cinnamomea*, *Conocybe digitalina*, *C. kuehneriana*, *Cortinarius calochrous* ssp. *coniferarum* var. *barbaricus*, *C. cinnamomeoluteus*, *C. dionysae*, *C. huronensis* var. *olivaceus*, *C. mucifluus*, *C. norvegicus*, *C. spadicellus*, *C. splendens* ssp. *meinhardii*, *Crustoderma dryinum*, *Cystoderma adnatifolium*, *C. tuomikoskii*, *Dacrymyces estonicus*, *Entoloma rhodocylix*, *E. rhodopium*



*f. rhodopolium*, *Galerina badipes*, *G. uncialis*, *Gymnopus ocior*, *Hebeloma perpallidum*, *Hydnellum spongiosipes*, *Hygrocybe phaeococcinea*, *Hygrophorus atramentosus*, *H. hyacinthinus*, *H. latitabundus*, *H. ponderatus*, *Inocybe adaequata*, *I. curvipes*, *I. flocculosa* var. *flocculosa*, *I. mixtilis*, *I. nitidiuscula*, *I. splendens* var. *splendens*, *I. vaccina*, *I. whitei*, *Lachnellula gallica*, *Lactarius leonis*, *Lentaria epichnoa*, *Lepiota echinacea*, *Macrolepiota prominens*, *Melanoleuca bresadolae*, *M. cognata* var. *pallidipes*, *M. crassotunicata*, *M. excissa* var. *excissa*, *M. favrei*, *M. grammopodia*, *M. pallidipes*, *M. polioleuca* f. *langei*, *M. polioleuca* f. *polioleuca*, *M. queletii*, *M. substrictipes*, *Mycena amicta*, *M. epipterygia* var. *epipterygioides*, *Morchella costata* f. *acuminata*, *M. eximia* f. *schizocostata*, *M. intermedia*, *Myxarium nucleatum* f. *nucleatum*, *Panellus violaceofulvus*, *Peniophora nuda*, *P. rufomarginata*, *Phanerochaete jose-ferreirae*, *Pholiota heteroclita*, *Pluteus primus*, *Protodontia subgelatinosa*, *Rhizopogon marchii*, *Russula anthracina* var. *insipida*, *R. emetica* var. *silvestris*, *R. firmula*, *R. galochroa*, *R. hortensis*, *R. mustelina*, *R. nauseosa*, *R. olivina*, *R. sphagnophila*, *R. subfoetens* var. *grata*, *Schizopora flavipora*, *Steccherinum oreophilum*, *Suillus leptopus* f. *litoralis*, *Tomentella atramentaria*, *Tricholoma triste*, *Tuber uncinatum*, *Urnula pouchetii*.

In addition, 101 taxa records represent new habitat/host/substrate reports for Greece. Some fungi were also recorded in/on new for the existing literature habitat/host/substrate (the until now existing information is placed in parenthesis): *Antrodia juniperina* on *Abies cephalonica* (*Juniperus* spp.), *Amylostereum laevigatum* on *A. cephalonica* (*Juniperus*, *Taxus*, *Thuja*), *Protodontia subgelatinosa* on *A. cephalonica* (deciduous wood, *Pinus*), *Steccherinum oreophilum* on *A. cephalonica* (deciduous wood); *Peniophora rufomarginata* on *Quercus frainetto* (*Tilia*); *Phellinus pini* on *A. cephalonica* (*Pinus* spp.); *Russula sphagnophila* in *Abies* needle litter (*Sphagnum*); *Lyophyllum fumosum* on charcoal (soil). Moreover, *Suillus leptopus* var. *litoralis* was recorded in this mountainous area, although it is known as a species occurring in coastal areas. In the first part of this work (Dimou et al. 2002), two other species (*Geastrum nanum*, *Xerula xeruloides*), which are also considered as coastal, were found in this mountain.

Especially as regards the identification of *Morchella* specimens, there is a serious controversy on whether the various forms of ascomata constitute different species or if fluctuations in their morphology is due to different climatic or edaphological conditions. We decided to follow Jacquetant's (1984) approach since we often found (mainly during the more-rich spring of 2004) different morphological forms of *Morchella* specimens in the same location (hence this variation could not be attributed to different environmental conditions).

Finally, of special interest are the comments on the microscopic features of some species (e.g. *Conocybe blattaria*, *Crepidotus cesatii* var.

*cesatii*, *Galerina vittiformis* var. *pachyspora*, *Gymnopilus sapineus*), which contribute to the existing literature.

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