

Taxonomic studies on some agaricoid and boletoid fungi of Turkey

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Abstract: Four alnicolous (*Alnicola citrinella*, *A. suavis*, *Cortinarius alnetorum*, and *Gyrodon lividus*), 2 cortinarioid (*Cortinarius alnetorum* and *C. scutulatus*), 3 entolomatoid (*Entoloma conferendum*, *E. pallescens*, and *E. sordidulum*), 1 hebelomatoid (*Hebeloma* aff. *aestivale*), and 2 clitocyboid (*Clitocybe applanata* and *C. elegantula*) fungi were collected, studied, illustrated, and first reported for the Turkish mycota from Trabzon. *Cortinarius alnetorum* was evaluated as both an alnicolous and cortinarioid species. Field trips were made in 2012 and 2013, and the microscopical studies were performed in January and February 2014. Identification of the collections was made according to morphological investigations and field characteristics.

Key words: *Alnicola*, *Clitocybe*, *Cortinarius*, *Entoloma*, *Gyrodon*, *Hebeloma*, new records

1. Introduction

Sesli and Baydar (1996) made a preliminary checklist of Agaricales of Turkey. Sesli (1997) reported 2 new records of cantharelloid fungi for Turkey. Sesli (2007) documented the mycota of the east and middle Black Sea regions of Turkey. Kaya et al. (2010) reported 3 coprinoid macrofungi taxa that were new to Turkey. Doğan et al. (2012) documented macrofungi distribution in Cocakdere valley in central Taurus, and 186 taxa were identified in this study; 4 were new records for the Turkish mycota. Akata and Kaya (2013) determined 3 pyronemataceous macrofungi genera new to the Turkish mycota. Sesli and Helfer (2013) referred to 3 new records (*Entoloma noordeloosi* Hauskn., *Inocybe lutescens* Velen., and *Tricholoma saponaceum* var. *squamosum* (Cooke) Rea) in another paper. In an earlier study we reported 7 new records for the Turkish mycota (Sesli, 2014). The total number of ascomycetous fungi recognized as occurring in Turkey increased to 217 with the recent study by Uzun et al. (2014). Lichenized and lichenicolous fungi of Gevne valley (Konya, Antalya) were documented by Kocakaya et al. (2014). Solak et al. (2014) identified 136 taxa belonging to 40 families in Antalya Province, and 3 of them (*Cortinarius subferrugineus*

(Batsch) Fr., *Entoloma vernum* S. Lundell, and *Inocybe piceae* Stangl & Schwöbel) were new records for Turkey. The total number of agaricoid and boletoid fungal species (Basidiomycota) of Turkey increased to 1955 with the present study (Sesli and Denchev, 2008).

Although many new records have been published in recent years, alnicolous fungi of Turkey have not yet been documented with the exception of a few mycorrhizal samplings identified by DNA (Pölme et al., 2013; roots of *Alnus orientalis* in southern Turkey), which report only 2 *Tomentella*, 1 *Inocybe*, 1 *Paxillus*, and 1 *Geopora*, all unnamed. To date only one species (*Alnicola scolecina* (Fr.) Romagn.) has been collected in West Anatolia (Öner and Gezer, 2004). The purpose of the present study was to contribute to the Turkish mycota by adding new agaricoid and boletoid fungal records.

2. Materials and methods

Basidiomes were collected in Hıdırnebi and Maçka in 2012 and 2013. Field notes and photos were taken in situ. Five to 10 basidiomes at different developmental stages were collected for each taxon, put in appropriate paper bags, and brought to the laboratory. The pileus of a basidiome

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was cut and placed in an appropriate plastic bag to obtain spore prints for each item in the collection, and the rest of the materials were dried for future microscopic studies (Cléménçon, 2009). Most of the microscopic studies were performed at Karadeniz Technical University (Trabzon) and a few at personal laboratories in Barcelona, Olbia, and Valdarno. A Zeiss Axio Imager trinocular research microscope was used to illuminate internal structures such as pileipellis, cystidia, basidia, and spores. We cut the pileus, lamellae, and stipe of the collected materials by hand with a razor blade under a stereo microscope. All the samples were mounted in distilled water, dilute ammonia, and congo red and observed under a microscope. Identification and descriptions of the taxa were made according to macro- and micromorphological data obtained from laboratory and field studies (Favre, 1955; Harmaja, 1969; Singer, 1978; Cléménçon, 1984; Noordeloos, 1992; Breitenbach and Kränzlin, 1995; Bon, 1997; Raitelhuber, 1997; Bas et al., 1999; Breitenbach and Kränzlin, 2000; Noordeloos, 2004; Moreau, 2005;

Knudsen and Vesterholt, 2008). Authors and fungal names were quoted according to Kirk et al. (2008) and Robert et al. (1999).

3. Results

Eleven basidiomycetous fungi were collected, dried, illustrated, described, and reported in this study along with a discussion of their taxonomic position. Additionally, we offered a simple key for the *Alnicola* species recorded in Turkey to date.

3.1. Agaricales Underw.

3.1.1. Cortinariaceae R.Heim ex Pouzar

3.1.1.1. *Cortinarius alnetorum* (Velen.) M.M.Moser, Kleine Kryptogamenflora von Mitteleuropa - Die Blätter- und Baupilze (Agaricales und Gastromycetes) IIB/2: 336 (1967) (Syn. *Agaricus iliopodius* Bull.; *Cortinarius alnetorum* f. *iliopodius* (Bull.) A. de Haan & Volders; *C. iliopodius* (Bull.) Fr.; *Hydrocybe alnetorum* (Velen.) M.M.Moser; *H. iliopodia* (Bull.) M.M.Moser; *Telamonium alnetorum* Velen.; *T. iliopodia* (Bull.) Wünsche) (Figure 1).

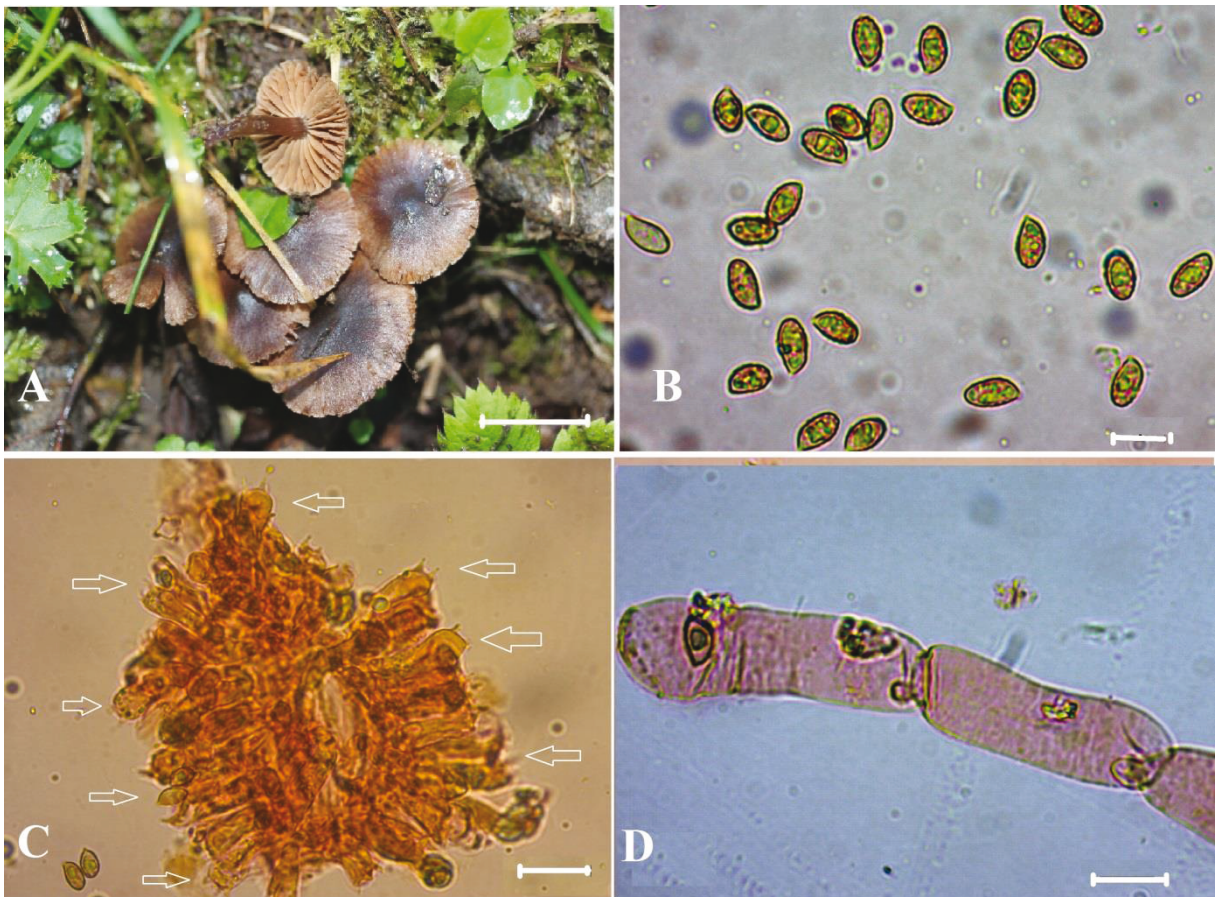


Figure 1. *Cortinarius alnetorum*: A- basidiomes, B- spores, C- basidia, D- periclinal hyphae (scale bars: A = 20 mm, B and D = 10 µm, C = 20 µm).

Pileus convex, campanulate or plane, umbonate, hygrophanous, dirty whitish to grayish floccose, 15–30 mm in diam., margin acute and slightly split, gray-brown to purplish chestnut-brown and blackish at the center. Lamellae pale brown to rusty and narrowly attached. Stipe cylindrical, sometimes slightly bulbous, fragile, purplish brown to honey-colored, whitish fibrillose, 40–75 × 2–4 mm. Context brownish, thin, and taste mild. Spores ellipsoid with a distinct apiculus, verrucose, 9–11.5 × 5–6 μm, yellowish brown. Basidia clavate, 4-spored and with basal clamp-connections, 35–40 × 9–10 μm. Pileipellis made up of periclinal hyphae; clamp-connections sometimes present.

Specimens examined: Trabzon, Akçaabat, Hidirnebi, 27/09/2013, gregarious and associated with *Alnus glutinosa*, Herbarium of Fatih Faculty of Education (FEFH Sesli 3265).

3.1.1.2. *Cortinarius scutulatus* (Fr.) Fr., *Epicrisis Systematis Mycologici*: 294 (1838) (Syn. *Agaricus scutulatus* Fr.;

Telamonia scutulata (Fr.) Wünsche; *Hydrocybe scutulata* (Fr.) M.M.Moser) (Figure 2).

Pileus hemispherical to convex or plane, umbonate, hygrophanous, whitish fibrillose, 25–55 mm in diam., margin incurved and slightly split, dark violet to reddish brown, or purplish chestnut-brown. Lamellae violet to reddish brown or purplish brown and broadly attached. Stipe cylindrical, somewhat larger towards base, fragile, sometimes bent, purplish brown to dark violet and covered with whitish fibrils, 60–120 × 3–10 mm. Context purplish brown, thin, and taste mild. Spores ellipsoid to amygdaliform, verrucose, yellowish, 10–12 × 6–7 μm. Basidia clavate, generally 4-spored, sometimes 1- or 2-spored, with basal clamp-connections, 35–45 × 9.5–11 μm. Marginal cells clavate, sometimes septate, 27–35 × 8–10 μm. Pileipellis made up of periclinal hyphae; clamp-connections present.

Specimens examined: Trabzon, Akçaabat, Hidirnebi, 11/09/2013, gregarious under *Alnus glutinosa*, Herbarium of Fatih Faculty of Education (FEFH Sesli 3222).

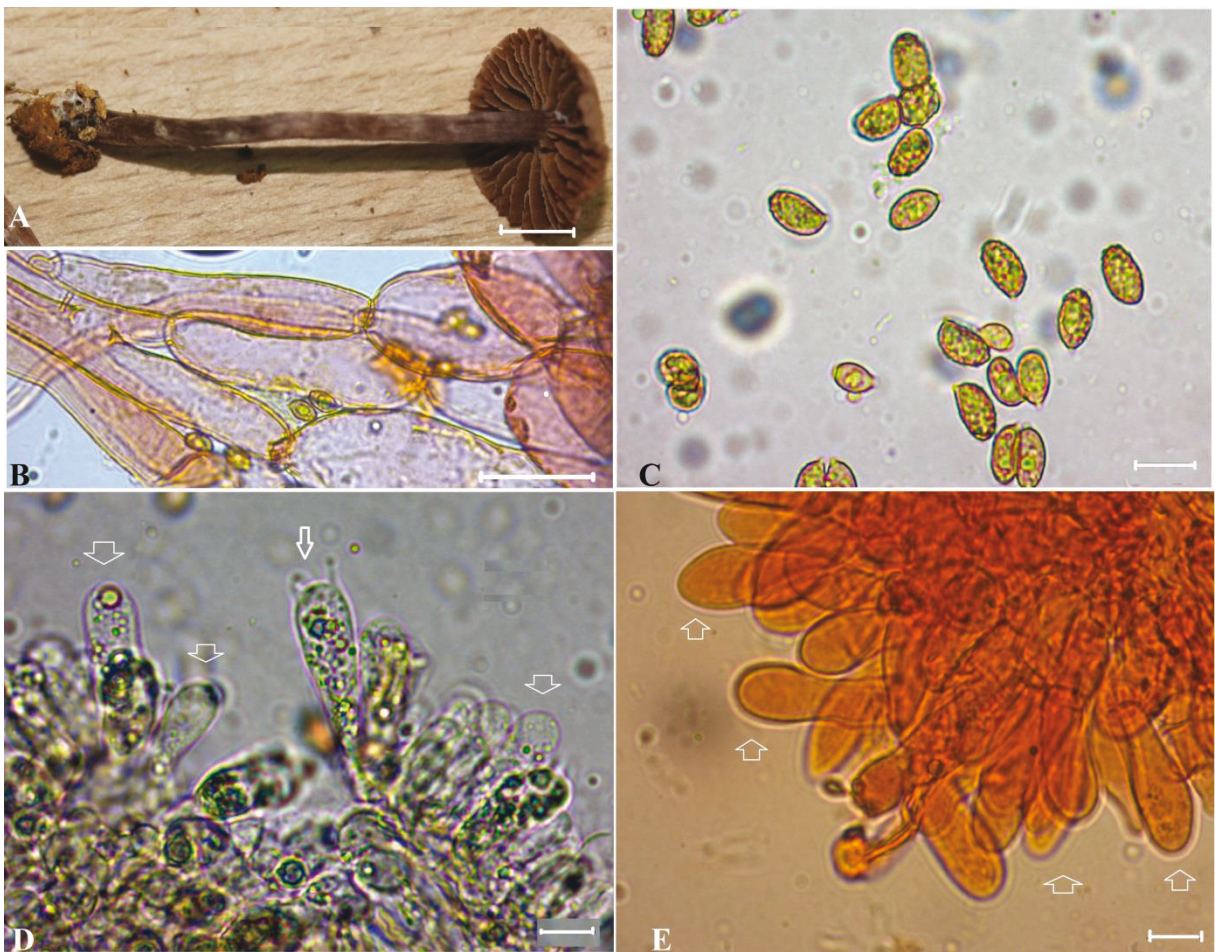


Figure 2. *Cortinarius scutulatus*: A- basidiome, B- hyphal cells, C- spores, D- basidia, E- marginal cells (scale bars: A = 20 mm; B, C, D, and E = 10 μm).

3.1.2. *Entolomataceae* Kotl. & Pouzar

3.1.2.1. *Entoloma conferendum* (Britzelm.) Noordel., Persoonia 10(4): 446 (1980) (Syn. *Agaricus conferendus* Britzelm.; *A. dissidens* Britzelm.; *A. postumus* Britzelm.; *Entoloma conferendum* (Britzelm.) Noordel. var. *conferendum*; *E. conferendum* (Largent & Thiers) Noordel. & Hauskn. var. *incrustatum*; *E. conferendum* (Romagn.) Bon & Courtec. var. *obscurior*; *E. conferendum* (Romagn. & J.Favre) Courtec var. *platyphyllum*; *E. conferendum* var. *pusillum* (Velen.) Noordel.; *E. conferendum* (Romagn.) Bon & Courtec. var. *rickenii*; *E. pasuum* sensu auct.; *E. rickenii* (Romagn.) Courtec.; *E. staurosporum* (Bres.) E.Horak; *E. staurosporum* (Velen.) Noordel. var. *pusillum*; *E. staurosporum* (Bres.) E.Horak var. *staurosporum*; *E. xylogenum* Courtec.; *Nolanea conferenda* (Britzelm.) Sacc.; *N. proletaria* sensu Rea; *N. pusilla* Velen; *N. rickenii* (Romagn.) Konrad & Maubl.; *N. staurospora* Bres.; *N. staurospora* Largent & Thiers var. *farinacea*; *N. staurospora* Largent & Thiers var. *incrustata*; *N. staurospora* Bres. var. *staurospora*; *N. xylophila* (J.E.Lange) P.D.Orton; *Rhodophyllus pusillus* (Velen.) Romagn.; *R. rickenii*

Romagn.; *R. rickenii* Romagn. var. *rickenii*; *R. rickenii* Romagn. var. *subrugosus*; *R. staurosporus* (Bres.) J.E.Lange; *R. staurosporus* Romagn. var. *obscurior*; *R. staurosporus* Romagn. subsp. *rickenii*; *R. staurosporus* Romagn. var. *platyphyllus*; *R. staurosporus* (Romagn.) Kühner & Romagn. var. *rickenii*; *R. staurosporus* (Bres.) J.E.Lange var. *staurosporus*; *R. staurosporus* Romagn. var. *subrugosus*; *R. xylophilus* J.E.Lange) (Figure 3).

Pileus campanulate or conical to convex, umbonate, smooth to fibrillose, hygrophanous, translucently striate, 30–40 mm in diam., yellowish brown or light greenish brown and blackish brown at the center. Lamellae adnate to nearly free, whitish to grayish or pinkish. Stipe cylindrical and slightly flattened enlarged towards base, yellowish brown to grayish brown, 30–75 × 3–7 mm, surface silvery striate. Context pale brown, thin, and taste mild. Spores generally cruciform or 4–5 angled, 8–12 × 7–11 μm. Cystidia and clamp-connections absent. Basidia tetrasporic, cylindrical ventricose to clavate, 30–40 μm in length and clampless. Pileipellis made up of periclinal hyphae with exserted ends up to 20 μm across.

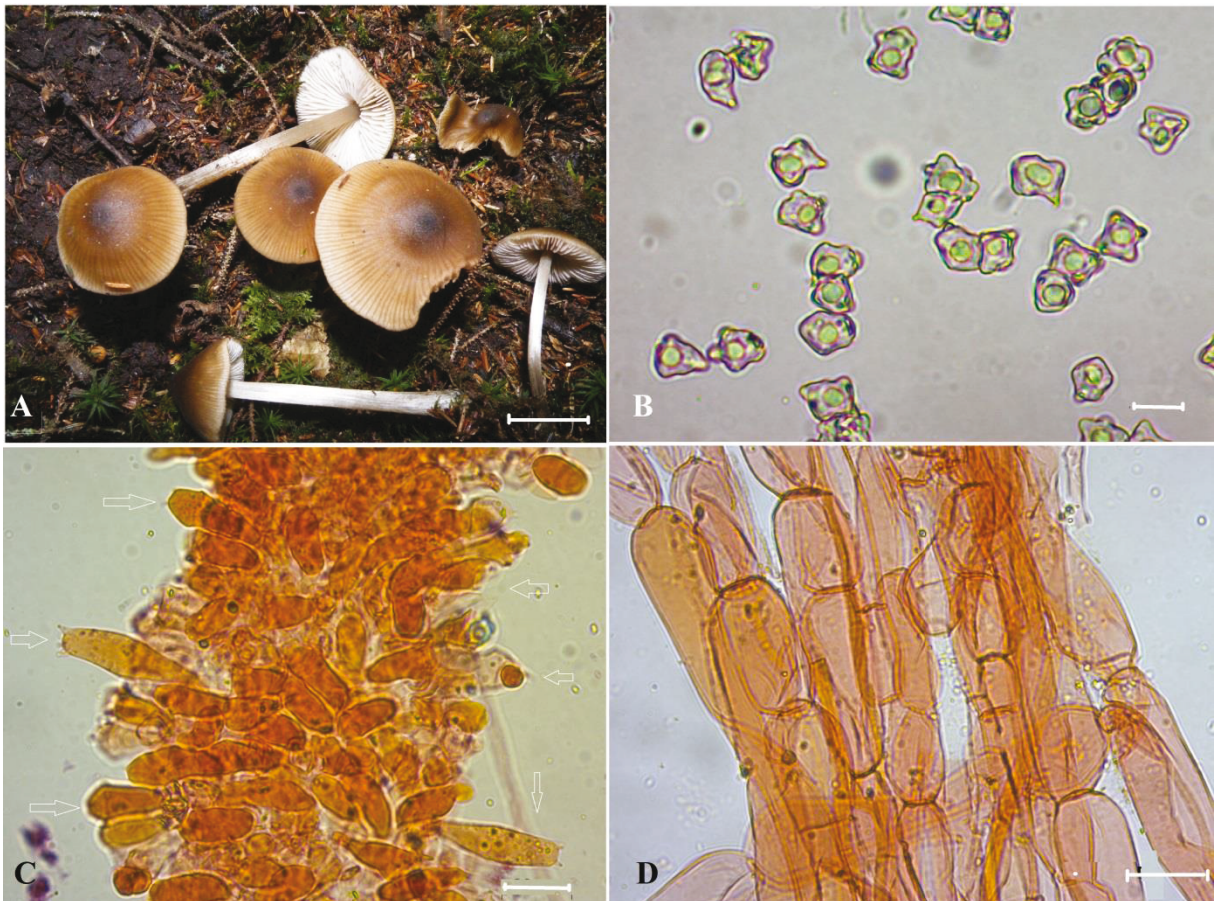


Figure 3. *Entoloma conferendum*: A- basidiomes, B- spores, C- basidia, D- hyphal cells (scale bars: A = 20 mm, B = 10 μm, C and D = 20 μm).

Specimens examined: Trabzon, Akçaabat, Hıdırnebi, 11/06/2013, solitary to gregarious, under *Picea orientalis* L., Herbarium of Fatih Faculty of Education (FEFH Sesli 3146).

3.1.2.2. *Entoloma pallescens* (P.Karst.) Noordel., Persoonia 10 (2): 251 (1979) (Syn. *Nolanea pascua* var. *pallescens* P.Karst.; *Nolanea pallescens* (P.Karst.) P.Karst.) (Figure 4).

Pileus conical, glabrous or with weak fibrils, umbonate, hygrophanous, translucently striate, 30–80 mm in diam., fragile, golden brown. Lamellae adnate to nearly free, flesh-colored to pinkish brown. Stipe cylindrical, slightly flattened, and typically enlarged towards base, silvery striate and distinctly pruinose on the surface, fibrous, gray to brown, hollow, 30–120 × 5–10 mm. Context pale brown, thin, and taste indistinct. Spores heterodiametrical and with 5–7 angles, 10–12 × 7–8.5 μm. Basidia tetrasporic, cylindrical to clavate, 35–40 μm in length, clamped. Cystidia absent. Pileipellis made up of periclinal hyphae with intraparietal and diffuse vacuolar pigment. Clamp-connections present in all tissues.

Specimens examined: Trabzon, Akçaabat, Hıdırnebi, 01/06/2012, solitary to gregarious, under *Picea orientalis*

L., Herbarium of Fatih Faculty of Education (FEFH Sesli 3055).

3.1.2.3. *Entoloma sordidulum* (Kühner & Romagn.) P.D.Orton, Transactions of the British Mycological Society 43 (2): 175 (1960) (Syn. *Rhodophyllus sordidulus* Kühner & Romagn.) (Figure 5).

Pileus convex to more or less applanate, 14–25-mm broad, margin at first inflexed, then deflexed and poorly translucently striate, umbo indistinct, surface smooth, gray to ochraceous brown, beige or reddish brown, lamellae crowded, adnate, emarginated, segmentiform to narrowly ventricose, whitish, grayish to pinkish; edge irregularly serrate, concolorous. Stipe cylindrical, somewhat flattened, and enlarged at the base, hollow, 40–70 × 3–8 mm, fibrillose, pruinose especially at apex, whitish to pale gray. Context scanty with a farinaceous-rancid smell; taste not recorded. Spores 5–6-angled in side view, mainly iso- and subisodiametrical, 6.5–9 × 5.5–7.5 μm. Basidia 4-spored, rarely 2-spored, clamped, 33–45 × 9–13 μm. Cheilo- and pleurocystidia absent. Pileipellis a cutis of radially arranged, cylindrical, sometimes clamped hyphae, 3–10-μm wide. The pigment is epiparietal.



Figure 4. *Entoloma pallescens*: A, B- basidiome; C- spores; D- basidia (scale bars: A and B = 20 mm, C = 10 μm, D = 20 μm).

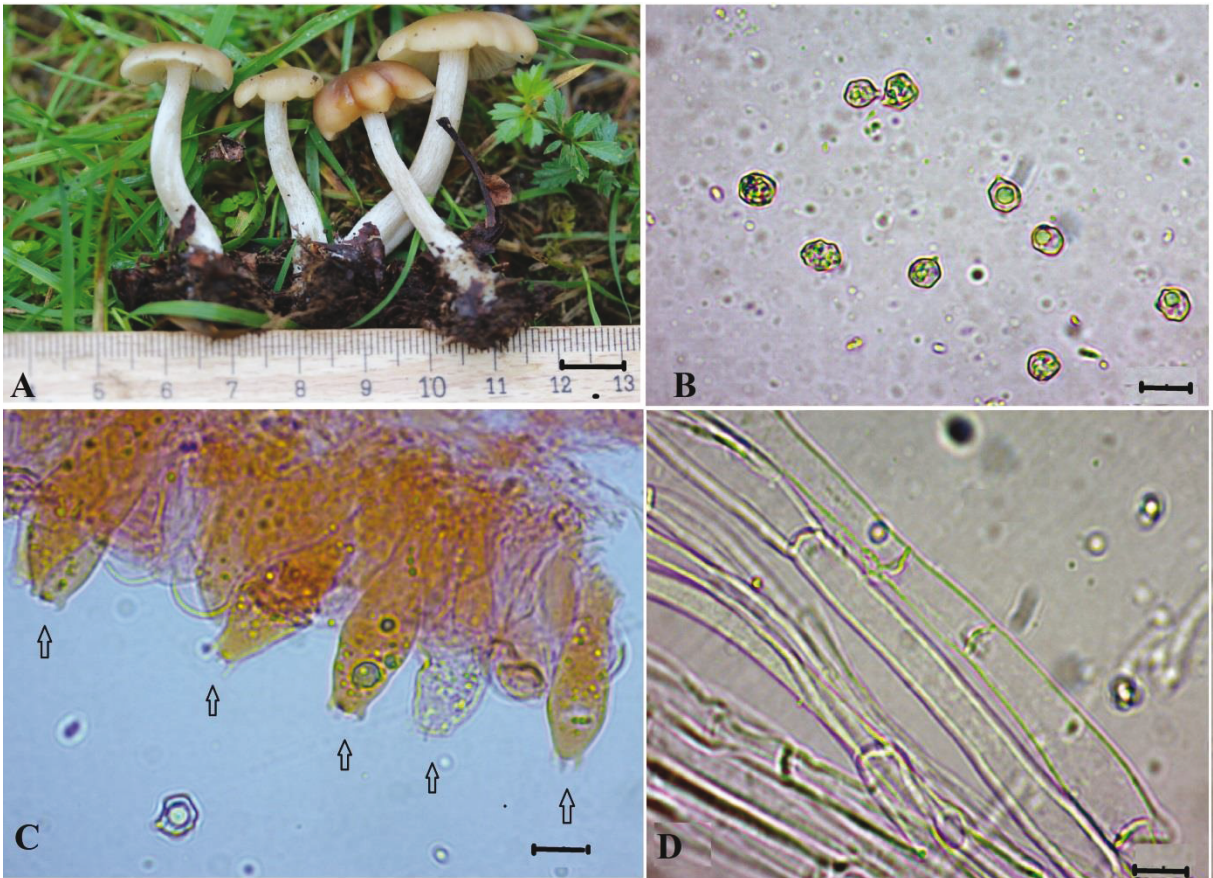


Figure 5. *Entoloma sordidulum*: A- basidiomes, B- spores, C- basidia, D- clamped hyphae (scale bars: A = 10 mm; B, C, and D = 10 μ m).

Specimens examined: Trabzon, Maçka, Sevinç, 17/09/2013, under *Picea orientalis*, Herbarium of Fatih Faculty of Education (FEFH Sesli 3233).

3.1.3. Strophariaceae Singer & A.H.Sm.

3.1.3.1. *Alnicola citrinella* P.A.Moreau & A. de Haan, Sterbeekia 31: 3 (2012) (Figure 6).

Pileus hemispherical when young, convex to plane with time or sometimes irregularly saddle-shaped, some indistinctly umbonate, surface finely tomentose or slightly scurfy and unlined, 10–30 mm in diam., gray brownish to honey-colored and darker towards center. Margin typically dentate, never striate. Lamellae adnate to subdecurrent or notched, whitish at first, later pale or lemon yellow to brownish. Stipe cylindrical, larger towards base, generally slightly bulbous and bent near the base, 20–60 \times 2–4 mm, honey-colored or yellowish brown, whitish fibrillose and pruinose, some with a typical whitish mycelium at the base. Context off-white to brownish or honey-colored, taste bitter at least when young, sometimes not distinctive or slightly mild when old, and odor distinctly raphanoid. Spores amygdaloid, some fusiform, coarsely ornamented and the apex typically elongated, lemon yellow, 8.5–12

\times 4.5–6.5 μ m. Basidia clavate, 25–32 \times 8.5–10 μ m, with 4(2)-spored and with basal clamp-connections. Cheilocystidia lageniform to rostrate or lanceolate with a small apical mace, 25–50 \times 5–13 μ m. Pileipellis made up of 25–50 μ m broadly elliptical cells, septa with clamp-connections.

Specimens examined: Trabzon, Akçaabat, Hıdırnebi, 07/09/2012, in groups to cespitose and strictly associated with *Alnus glutinosa*, Herbarium of Fatih Faculty of Education (FEFH Sesli 3104).

3.1.3.2. *Alnicola suavis* (Bres.) Kühner, Bulletin de la Société Mycologique de France 47 (3-4): 242 (1931) (Syn. *Naucoria suavis* Bres.; *Hylophila suavis* (Bresadola) Quélet) (Figure 7).

Pileus convex to plane, velvety to scaly or finely tomentose, 15–30 mm in diam., hygrophanous, margin slightly crenate, olive grayish to dirty grayish yellow, paler towards margin. Lamellae olive grayish to pale brown. Stipe cylindrical, thicker towards base or slightly bulbous, grayish to pale brown, whitish fibrillose, 25–50 \times 2–3 mm. Context grayish brown, thin, and taste bitter. Smell sweet, like orange flowers. Spores fusiform to amygdaliform,

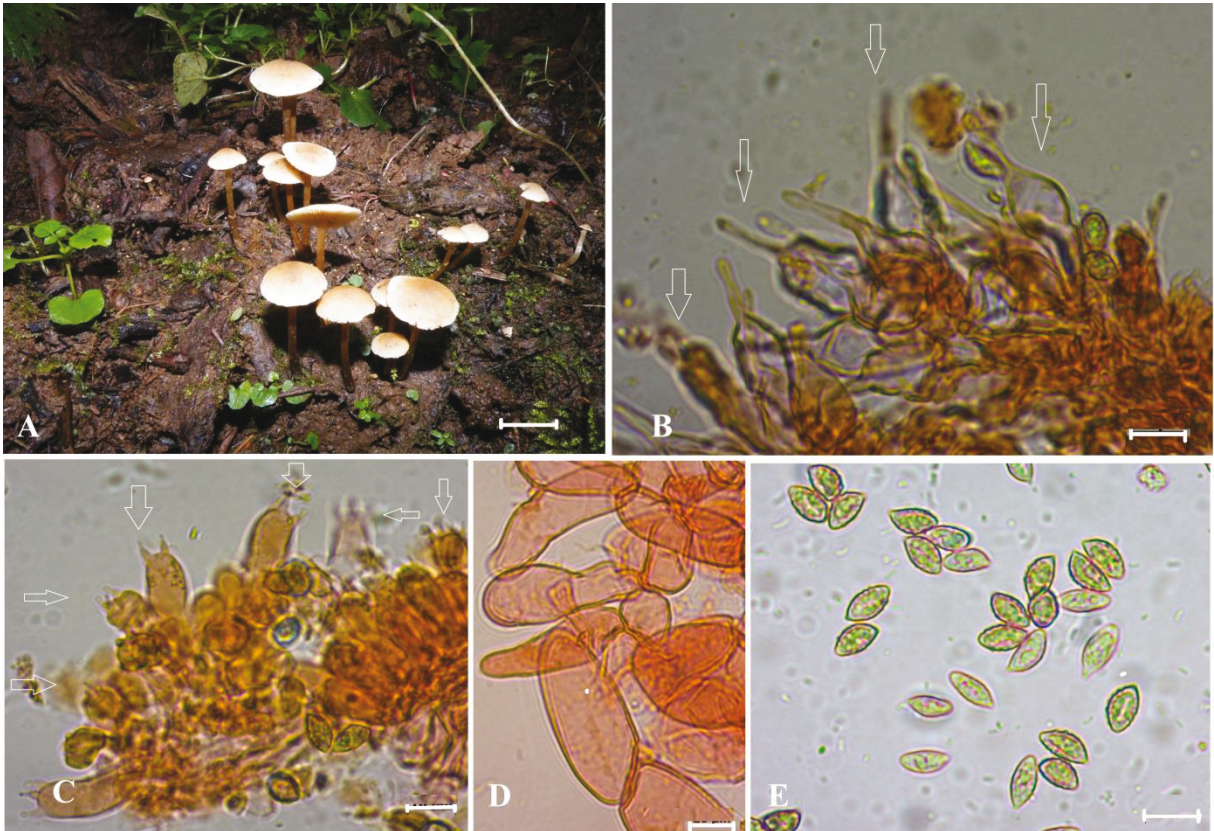


Figure 6. *Alnicola citrinella*: A- basidiomes, B- cheilocystidia, C- basidia, D- pileipellis, E- spores (scale bars: A = 20 mm; B, C, D, and E = 10 µm).

slightly verrucose, $8.5\text{--}11 \times 4.5\text{--}5.5 \mu\text{m}$, and lemon yellow. Basidia clavate, 4(2)-spored, and with basal clamp-connections, $24\text{--}32 \times 8.5\text{--}10 \mu\text{m}$. Cheilocystidia ventricose, urticoid, ampulliform to rostrate, $30\text{--}55 \times 6\text{--}11 \mu\text{m}$. Pileipellis made up of $4\text{--}13\text{-}\mu\text{m}$ wide periclinal to ascending hyphae; clamp-connections sometimes present.

Specimens examined: Trabzon, Akçaabat, Hidirnebi, 11/09/2013, gregarious and associated with *Alnus glutinosa*, Herbarium of Fatih Faculty of Education (FEFH Sesli 3217).

3.1.3.3. *Hebeloma* aff. *aestivale* Vesterh., Symbolae Botanicae Upsalienses 30: 131 (1995) (Figure 8).

Pileus conical to convex, or changing according to habitat, sometimes slightly undulate, moderately slimy, $30\text{--}75 \text{ mm}$ in diam., smooth, pale brown to wood-colored, paler towards slightly incurved margin. Lamellae broadly attached, crowded, and pinkish brown. Stipe cylindrical, somewhat enlarged towards base, $40\text{--}70 \times 5\text{--}15 \text{ mm}$, fragile, whitish fibrillose. Context whitish, taste and smell raphanoid. Spores amygdaliform to citriform, light brownish, verrucose, $10\text{--}13 \times 6.5\text{--}8 \mu\text{m}$. Basidia bi- or tetrasporic, clavate, $25\text{--}35 \times 9\text{--}10 \mu\text{m}$, clamped. Cheilocystidia cylindrical to clavate, $40\text{--}60 \times 7\text{--}9 \mu\text{m}$.

Pileipellis made up of hyaline hyphae with conspicuous clamp-connections.

Specimens examined: Trabzon, Maçka, Bakımlı, 12/09/2012, gregarious, under *Picea orientalis*, Herbarium of Fatih Faculty of Education (FEFH Sesli 3127).

3.1.4. Tricholomataceae R.Heim ex Pouzar

3.1.4.1. *Clitocybe applanata* Secr. ex Sacc., Sylloge Fungorum 5: 185 (1887) (Syn. *Agaricus orbiformis* var. *applanatus* Fr.; *Clitocybe applanata* (Fr.) M.M.Moser ex Bon & Courtecuisse, illeg. (superfl.)) (Figure 9).

Pileus convex or typically irregular with a depressed center when young later plane to umbilicate or infundibuliform, the margin irregularly undulating and typically lobed. The surface of the pileus is striped towards margin, smooth, $20\text{--}50 \text{ mm}$ in diam., dull to lardaceous, dingy whitish or gray-beige to brownish gray, paler towards margin. Flesh very thin especially towards margin. Lamellae decurrent, white when young later cream-colored. Stipe cylindrical, surface smooth and concolorous with pileus, shiny; base attached to fragments of leaves, moss or bush, $10\text{--}40 \times 3\text{--}5 \text{ mm}$. Spores hyaline, with drops and $4.5\text{--}6 \times 2.5\text{--}3 \mu\text{m}$. Basidia $27\text{--}32 \times 5\text{--}6 \mu\text{m}$, 2–4-spored and with basal clamp-connections. Hymenial

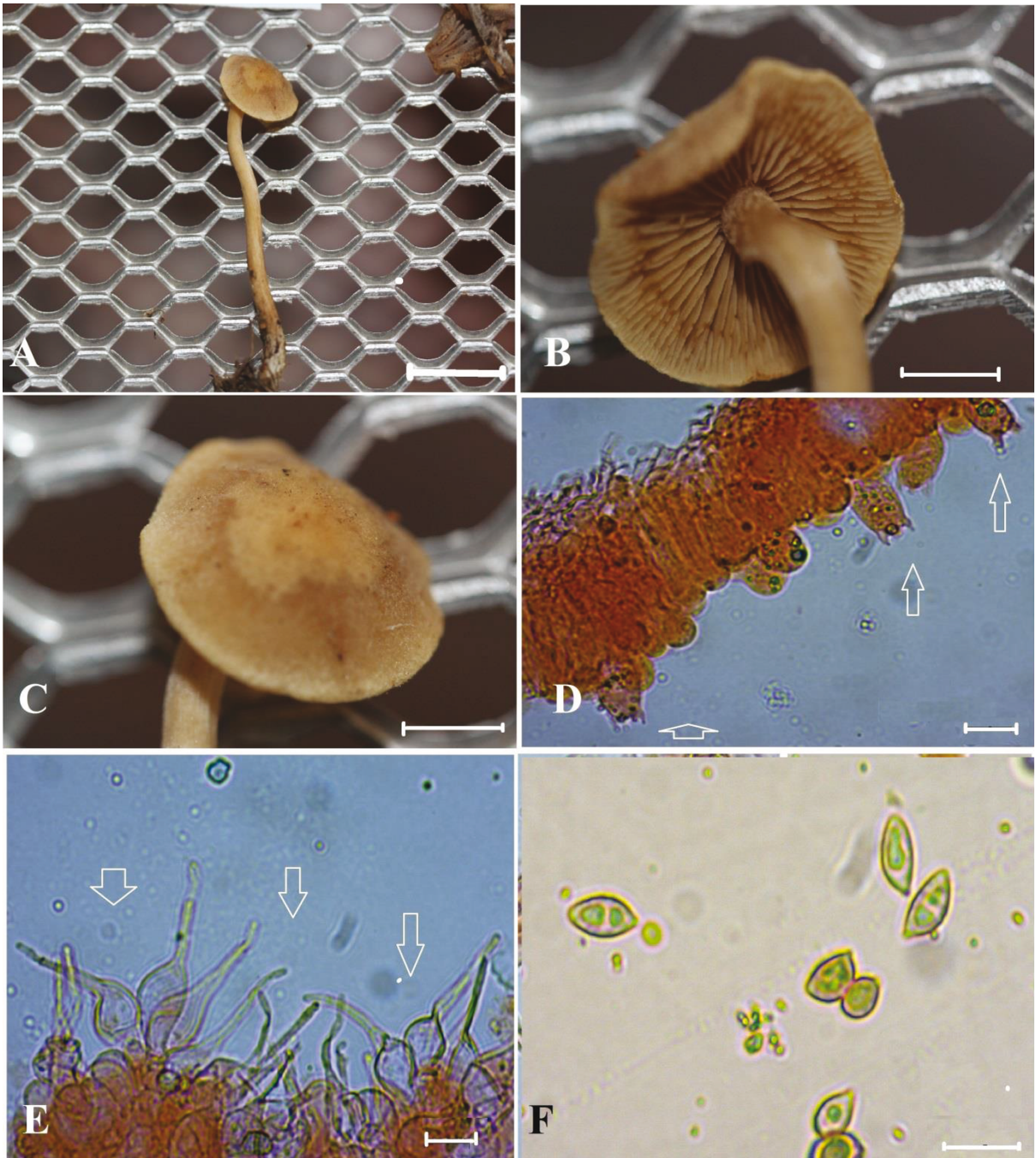


Figure 7. *Alnicola suavis*: A, B, and C- basidiomes; D- basidia; E- cheilocystidia; F- spores (scale bars: A = 30 mm; B and C = 10 mm; D, E, and F = 10 μ m).

trama made up of cylindrical elements $90\text{--}95 \times 7\text{--}18 \mu\text{m}$, some hyphae with clamp-connections. Pileipellis $65\text{--}130 \times 3\text{--}16 \mu\text{m}$, has intracellular pigmentation, and some hyphae have clamp-connections.

Specimens examined: Trabzon, Maçka, Yukarıköy, 12/09/2012, on nutrient-rich soils, on leaf or needle litter of *Picea orientalis* among mosses, Herbarium of Fatih Faculty of Education (FEFH Sesli 3123).

3.1.4.2. *Clitocybe elegantula* J.Favre, Ergebnisse der Wissenschaftlichen Untersuchungen des Schweizerischen Nationalparks 6: 424 (1960) (Figure 10).

Pileus convex when young, later plane and irregularly undulating, center slightly umbonate. Surface smooth, hygrophaneous, cream-beige and paler towards margin. Margin lobed, 20–60 mm in diam. Lamellae decurrent, whitish when young later cream-colored to beige. Stipe

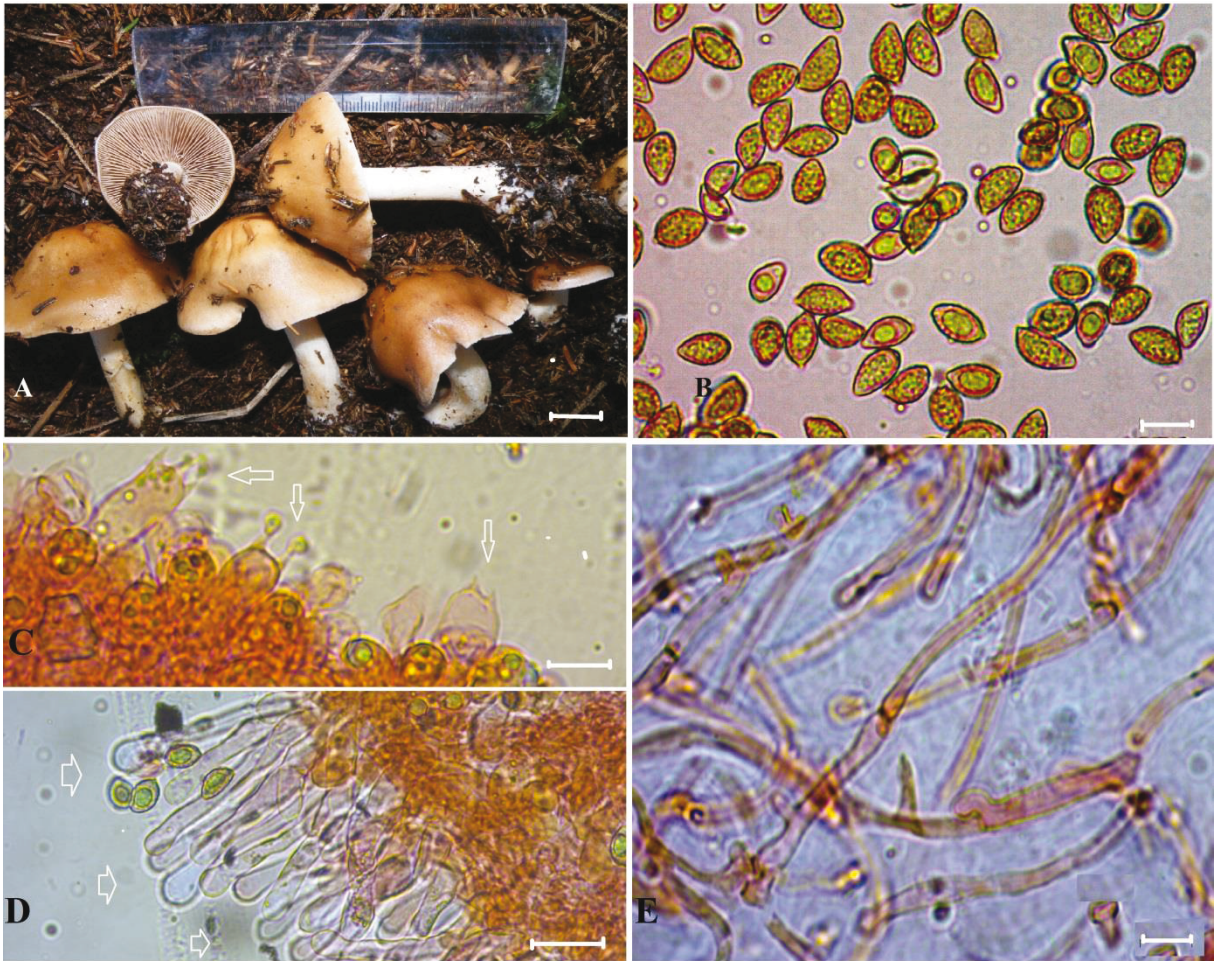


Figure 8. *Hebeloma* aff. *aestivale*: A- basidiomes, B- spores, C- basidia, D- cheilocystidia, E- pileipellis (scale bars: A = 10 mm; B, C, and E = 10 µm; D = 20 µm).

cylindrical, surface longitudinally fibrillose and typically pruinose, base attached to fragments of leaves by white mycelium, 20–50 × 4–7 mm, concolorous with the pileus. Context thin, especially at margin. Spores hyaline, with drops and 6–8 × 4–5 µm. Basidia 20–25 × 6–8 µm, 2–4-spored and with basal clamp-connections. Hymenial trama made up of cylindrical elements 80 × 4–10 µm, some hyphae with clamp-connections. Pileipellis, 50–130 × 4–18 µm, has intracellular pigmentation, and some hyphae have clamp-connections.

Specimens examined: Trabzon, Maçka, Yukarıköy, 12/09/2012, on nutrient-rich soils, on leaf or needle litter of *Picea orientalis* among mosses, Herbarium of Fatih Faculty of Education (FEFH Sesli 3116).

3.2. Boletales E.-J. Gilbert

3.2.1. Paxillaceae Lotsy

3.2.1.1. *Gyrodon lividus* (Bull.) Sacc., Sylloge Fungorum 6: 52 (1888) (Syn. *Boletus lividus* Bull.; *B. brachyporus* Pers.; *B. chrysenteron* var. *lividus* (Bull.) Mérat; *B. labyrinthicus* Fr.; *B. lividus* var. *alneti* Lindgr.; *B. rubescens* Trog; *B. rubescens* Trog; *B. sistotremoides* Fr.; *Gyrodon labyrinthicus* (Fr.) Mussat; *G. sistotremoides* Opat.; *Uloporus lividus* (Bull.) Qué!.) (Figure 11).

Pileus convex to plane, sometimes slightly funnel-shaped and undulate, fibrillose to tomentose, 20–110 mm in diam., grayish yellow or dark lemon yellow to yellowish brown and turning pinkish to reddish brown on handling. Margin incurved. Tubes decurrent, 3–6 mm in length,

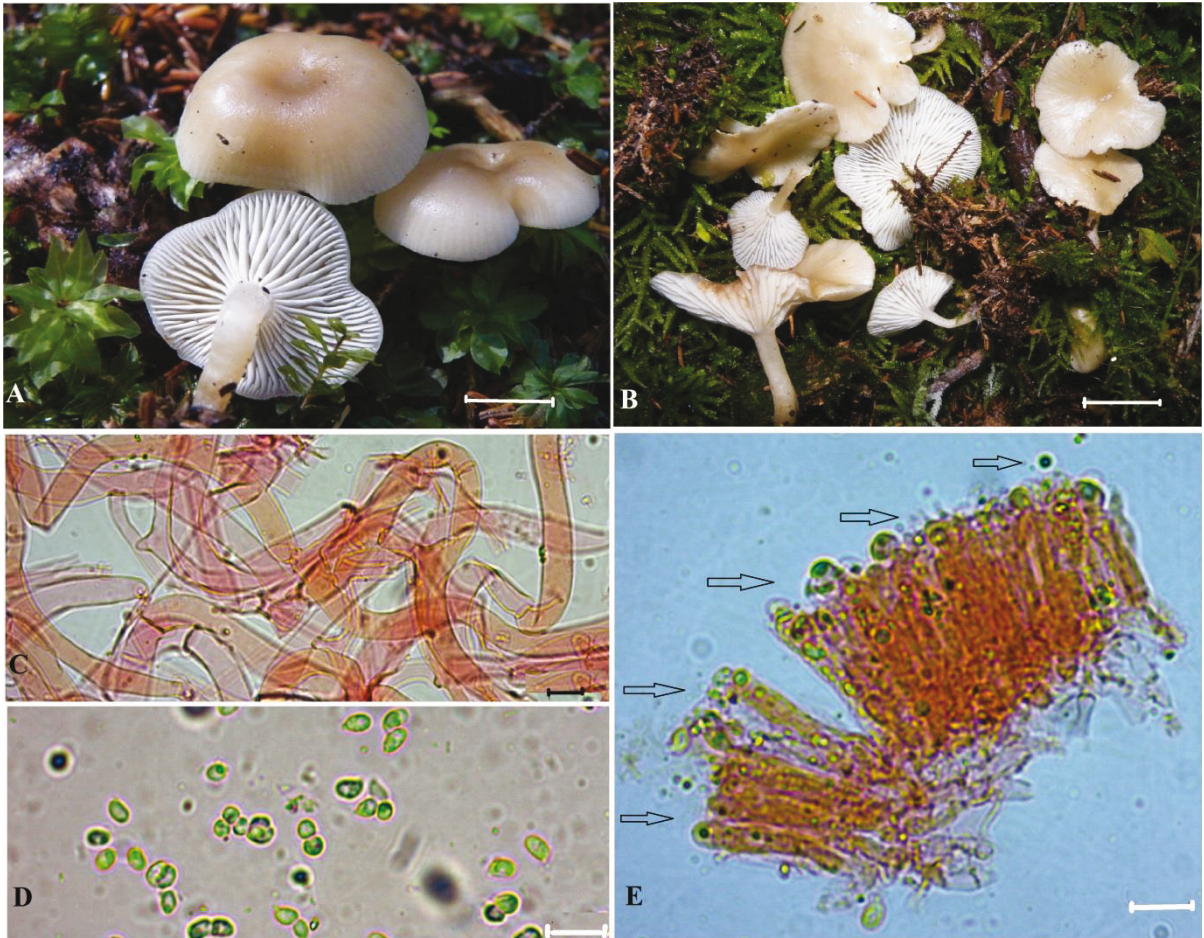


Figure 9. *Clitocybe applanata*: A and B- basidiomes, C- hyphal cells, D- spores, E- basidia (scale bars: A and B = 20 mm; C, D, and E = 10 µm).

light green-yellowish, typically turning blue and finally pinkish or reddish brown when crushed. Stipe cylindrical, enlarged at base and apex, sometimes slightly bent, fibrillose to tomentose, 35–90 × 5–13 mm, dirty-white to gray or pale yellow, turning reddish or pinkish brown on handling or when cut. Context spongy, dirty whitish, turning suddenly blue when bruised or cut and reddish brown with time. Spores ellipsoid, smooth, light brownish, with 1 or more drops, 5.5–7 × 3.7–4.5 µm. Basidia clavate, 25–37 × 7–8 µm and 2–4-spored. Cheilocystidia clavate or fusiform. Pileipellis made up of irregular hyphae with clamp-connections.

Specimens examined: Trabzon, Maçka, Sevinç, 17/09/2013, gregarious, Herbarium of Fatih Faculty of Education (FEFH Sesli 3242).

4. Discussion

Basidiomes of *Alnicola citrinella*, *A. suavis*, *Clitocybe applanata*, *C. elegantula*, *Cortinarius alnetorum*, *C. scutulatus*, *Entoloma conferendum*, *E. pallescens*, *E. sordidulum*, *Gyrodon lividus*, and *Hebeloma* aff. *aestivale*

were collected, studied, and reported for the first time from Turkey. The descriptions of the material examined agree well with those of the current literature; however, we have observed some differences that are worth discussing. According to Kirk et al. (2008), the genus *Alnicola* is classified within Strophariaceae; Robert et al. (1999) place it in Bolbitiaceae. We followed Kirk et al. (2008) and consider it a member of the Strophariaceae. According to the study by Moreau et al. (2006), the members of *Alnicola* have fusiform to lanceolate cystidia with a narrow neck, and most of them are strictly ectomycorrhizal with *Alnus*. We collected basidiomes near *Alnus glutinosa*, and the shape and size of basidiomes, cystidia, basidia, and spores of our collection correspond to those obtained by De Haan and Moreau (2012). We observed 2-spored basidia and macrospores in our collections, unlike Breitenbach and Kränzlin (2000), probably due to climatic variations, especially cold weather (Moreau, 2005). In addition to the *Alnicola* species presented in this paper, we have collected *Alnicola scolecina* (Fr.) Romagn. from the same region from which it was recorded as *Naucoria*

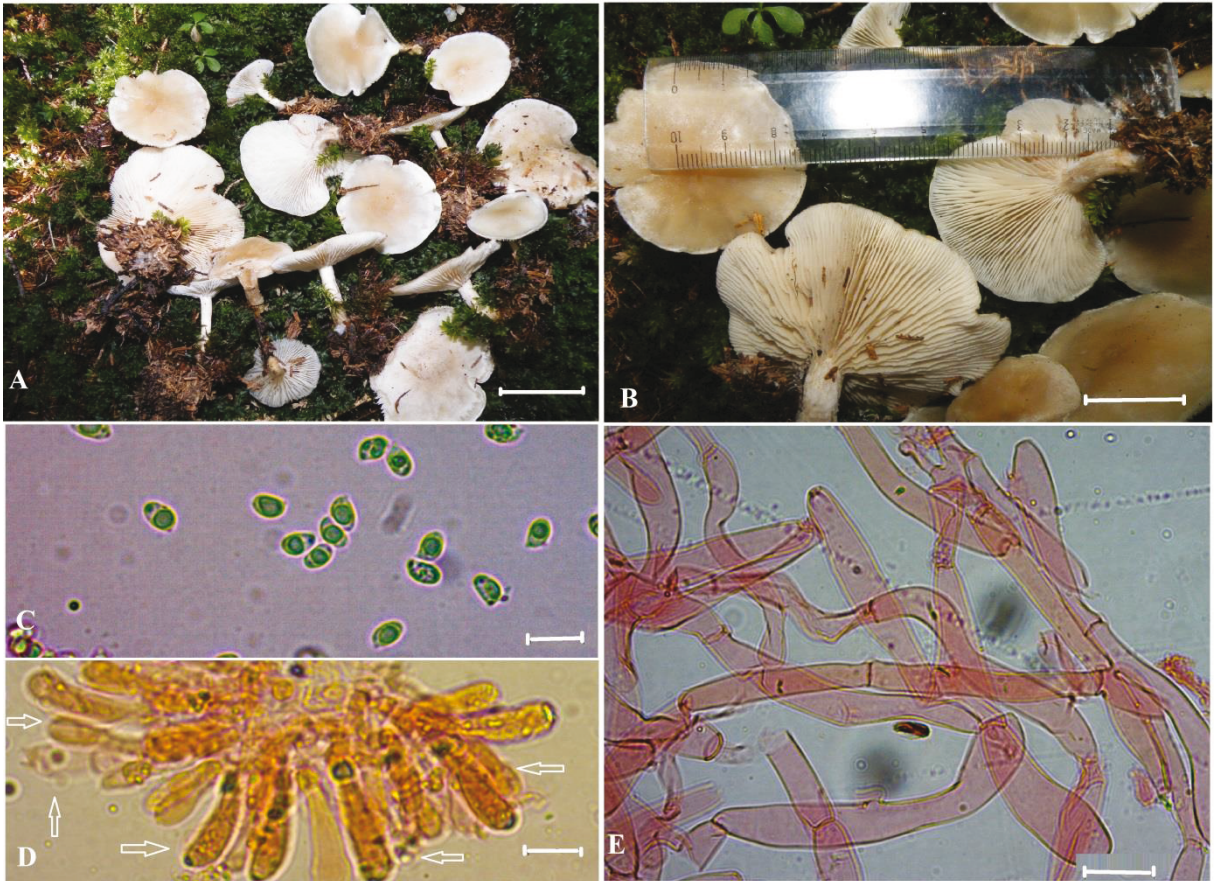


Figure 10. *Clitocybe elegantula*: A and B- basidiomes, C- spores, D- basidia, E- hyphal cells (scale bars: A and B = 30 mm; C, D, and E = 10 µm).

scolecina (Fr.) Quél. by Öner and Gezer (2004). *Alnicola citrinella* is reported by De Haan and Moreau (2012) as one of the most common *Alnicola* species associated with *Alnus glutinosa*, erroneously called *A. escharioides* in the literature. It is easily recognized by the bitter taste and pale unstriated pileus; the cystidia is typically vesicular at the base. We offer a simple key for *Alnicola* species recorded in Turkey to date:

1. Pileus striate when fresh. Colors pale ocher to reddish brown, lamellae with purplish tones when young*A. scolecina* s.auct. (see Moreau, 2005)¹
- 1*. Pileus never striate 2
2. Cheilocystidia with typical vesiculose to spherical base. Lamellae at first pale lemon-yellow. Odor raphanoid *A. citrinella*
- 2*. Cheilocystidia lanceolate with slightly inflated base. Yellow tinges absent from the basidiome. Odor sweet, like orange blossom *A. suavis*.

We reported another mycorrhizal fungus (*Gyrodon lividus*) from an *Alnus glutinosa*-dominated forest in this study that is the first record of this genus in Turkey. The values obtained from the field and laboratory for this collection are in good agreement with the literature; additionally, we found that the pileus surface of the basidiome turns pinkish to reddish brown on handling.

Cortinarius alnetorum is easily recognized by its typical umbo, gray-brown to purplish or chestnut-brown color and typical habitat (under *Alnus glutinosa* at the collection site (see Ortega and Vila, 2008), which is also an *Alnus* mycorrhizal species collected from the research area).

Clitocybe is a genus composed of a great number of entities distributed all over the world: to date, 1385 taxa have been recorded (Robert et al., 1999; Kirk et al., 2008), 42 exclusively in Turkey (Sesli and Denchev, 2008). We identified and reported 2 interesting species in this study (*Clitocybe applanata* and *C. elegantula*) based on the collections. Our descriptions match those in recent literature (Singer, 1978; Clémenton, 1984; Bon, 1997).

¹Collections under the name *A. scolecina* would require revision in order to be attributed either to *A. subconspersa* or *A. umbrina*.

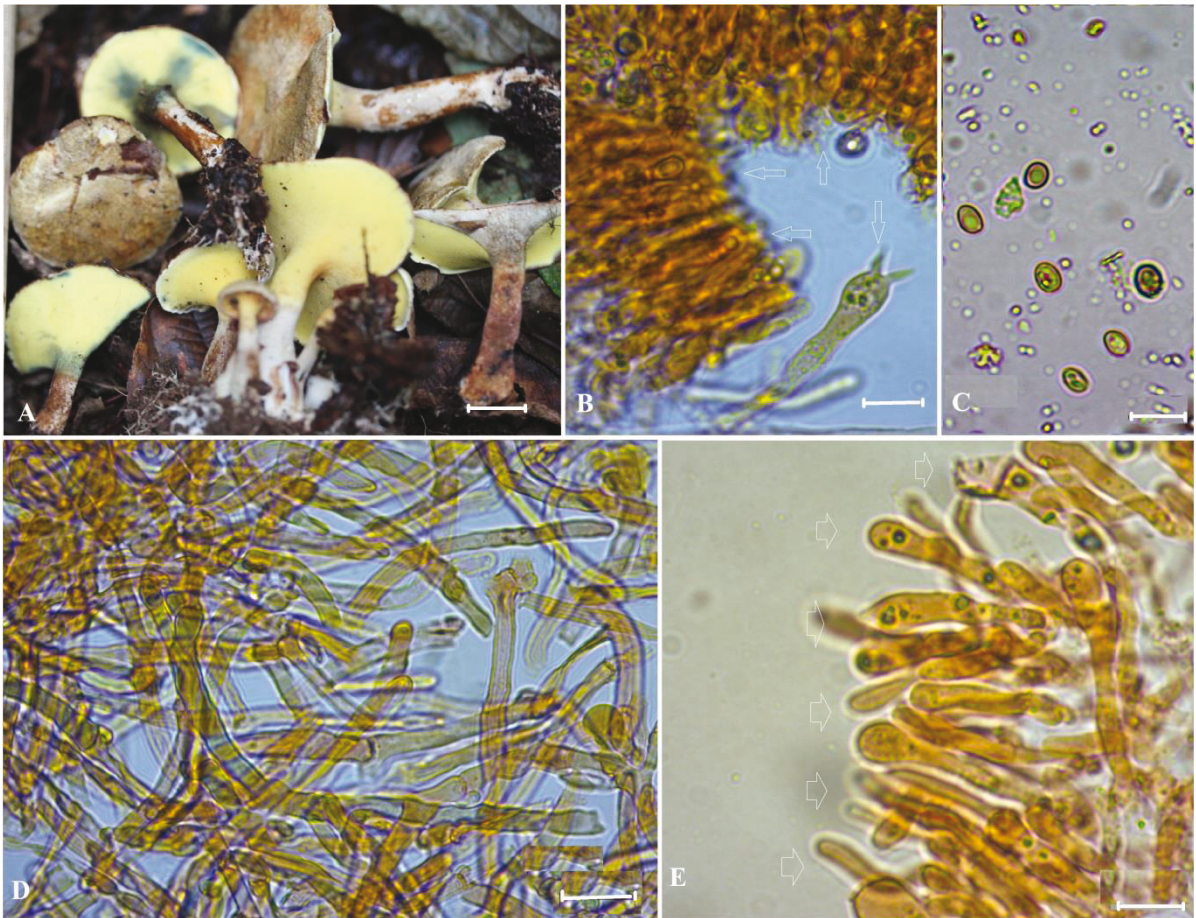


Figure 11. *Gyrodon lividus*: A- basidiomes, B- basidia, C- spores, D- pileipellis, E- cheilocystidia (scale bars: A = 20 mm; B, C, and E = 10 µm; D = 20 µm).

Cortinarius scutulatus is easily recognized in the field by the umbonate, hygrophanous, dark-violet to reddish-brown pileus covered with white fibrillae, purplish-brown lamellae, and fragile, purplish chestnut-brown to dark-violet stipe. According to Robert et al. (1999), *Cortinarius* is a very large genus, and nearly 5400 taxa have been recorded worldwide. Sesli and Denchev (2008) reported that the genus is represented by about 100 taxa in Turkey.

The genus *Entoloma* encompasses about 2145 taxa worldwide (Robert et al., 1999; Kirk et al., 2008), and 45 species were recorded in Turkey to date (Sesli and Denchev, 2008). We collected and described 3 *Entoloma* species (*Entoloma conferendum*, *E. pallescens*, and *E. sordidulum*) in this study, and our descriptions coincide with those in the literature (Noordeloos, 1987, 1992, 2004; Vila and Caballero, 2007).

The pileus of *Hebeloma* aff. *aestivale* is convex then expanded and viscid to slimy, according to Knudsen and Vesterholt (2008). In our material we noted that it could be slightly undulate depending on environmental conditions. Further studies are needed on this collection, because in respect to the literature we observed only a few small spores.

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