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# Two new *Rhodocybe* species (sect. *Rufobrunnea*, Entolomataceae) from the East Black Sea coast of Turkey

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**Abstract:** Two new species of *Rhodocybe, R. asanii* and *R. asyae* (Entolomataceae), are described and illustrated from the East Black Sea coast of Turkey. The new species are known from two different localities in Trabzon Province. Diagnostic morphological and molecular (nrITS and nrLSU sequences) characters between the new species and their allies are compared and discussed. *Rhodocybe asanii* is easily distinguished from related species by its small, reddish beige, convex to plate, or irregular, fragile pileus; adnexed to sinuate lamellae; a pruinose stipe; small basidiospores; and unique sequences. *Rhodocybe asyae* is recognized well by a rather small, thin, salmon pink, smooth, dish or slightly cup-shaped pileus; decurrent lamellae; a small, pruinose stipe; and different sequences from *R. asanii* and allied taxa. Some notes on the ecology of the newly described species, a key to the thus far known Turkish *Rhodocybe* taxa, and phylogenetic trees are provided.

**Key words:** Basidiomycota, Agaricomycetes, Agaricales, new species, Trabzon

## 1. Introduction

*Rhodocybe* Maire (1926) is a genus of Entolomataceae characterized by a mostly dull-colored, conical, convex or applanate to depressed funnel-shaped pileus; a cylindrical, flattened, grooved, or tapering (towards base) stipe; adnate to decurrent, rarely notched lamellae; a fleshy, salmon to brownish pink spore print and globose, ellipsoid to lacrymoid, slightly nodulose or weakly angular, warty spores (Baroni, 1981; Bas et al., 1988; Petersen and Vesterholt, 1990; Hansen and Knudsen, 1992; Ludwig, 2001; Knudsen and Vesterholt, 2008). Members of *Rhodocybe* are saprotrophic; they generally grow on the ground between debris, rarely on wood (Breitenbach and Kränzlin, 1995; Knudsen and Vesterholt, 2008).

Some new fungal records [*Alutaceodontia alutacea* (Fr.) Hjortstam & Ryvarden, *Antrodia ramentacea* (Berk. & Broome) Donk, *Conocybe mesospora* Kühner ex Watling, *Diplomitoporus flavescens* (Bres.) Domański, *Dumontinia tuberosa* (Bull.) L.M. Kohn, *Hebeloma sordidum* Maire, *Leucogyrophana romellii* Ginns, *Lycoperdon lambinonii* Demoulin, *Orbilia curvatispora* Boud., *O. sarraziniana* Boud., *O. xanthostigma* (Fr.) Fr., *Pholiotina striaepes* (Cooke) M.M. Moser, *Tulasnella violea* (Quél.) Bourdot & Galzin] have been added to the Turkish Mycota recently (Akata and Doğan, 2015; Doğan and Kurt, 2016) and some other contributions [(*Arrhenia acerosa* (Fr.) Kühner, *Entoloma politum* (Pers.) Noordel.] were added from Artvin Province of Turkey previously (Demirel et al., 2010).

According to Robert et al. (2005; http://www.mycobank.org) about 170 species of *Rhodocybe* have been documented to date in the world, 25 species in Europe and six of them also known from Turkey (Watling and Gregory, 1977; Sesli and Baydar, 1996; Kaya, 2001; Sesli and Denchev, 2014; Solak et al., 2015).

*Rhodocybe* is divided traditionally into seven sections (Baroni, 1981): *Claudopodes* Singer ex T.J. Baroni, *Crepidotoides* Singer, *Decurrentes* (Konrad & Maubl.) Singer, *Rhodocybe*, *Rhodophana* (Kühner) Singer, *Rufobrunnea* T.J. Baroni, and *Tomentosi* T.J. Baroni. However, Kluting et al. (2014), based on a multigene molecular analysis, recognized within *Rhodocybe* four monophyletic distinct genera: *Rhodocybe* s.s.; *Clitocella* Kluting, T.J. Baroni & Bergemann; *Clitopilopsis* Maire; and *Rhodophana* Kühner. These genera were also recovered in the ITS-LSU analyses by Vizzini et al. (2016a, 2016b).

Section *Rufobrunnea* of *Rhodocybe* s.s., typified by *R. roseiavellanea* (Murrill) Singer, is characterized by a reddish beige, salmon pink, pinkish brown, ochre or reddish brown pileus; adnate or decurrent lamellae;

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and absence of clamp-connections (Baroni, 1981; Bas et al., 1988; Petersen and Vesterholt, 1990; Knudsen and Vesterholt, 2008).

The aim of the present paper is to fully describe two new species of section *Rufobrunnea* from Turkey, *Rhodocybe asanii* and *R. asyae*, based on morphological and molecular data (analysis of nrITS and nrLSU sequences). Prior to this study, *Rhodocybe tugrulii* Vizzini, E. Sesli, T. J. Baroni, Antonín & I. Saar was described as new to science from Turkey. In addition to this recently described new species, only *Clitocella fallax* (Quél.) Kluting, T.J. Baroni & Bergemann [= *Rhodocybe fallax* (Quél.) Singer]; *Clitocella popinalis* (Fr.) Kluting, T.J. Baroni & Bergemann [= *R. popinalis* (Fr.) Singer]; *Clitopilopsis hirneola* (Fr.) Kühner [= *R. hirneola* (Fr.) P.D. Orton]; *Rhodocybe gemina* (Fr.) Kuyper & Noordel.; and *Rhodophana nitellina* (Fr.) Papetti [= *Rhodocybe nitellina* (Fr.) Singer] were recorded from Turkey to date (Watling and Gregory, 1977; Sesli and Baydar, 1996; Kaya, 2001; Solak et al., 2015).

## 2. Materials and methods

### 2.1. Collection areas and microscopical studies

Basidiomata of the types were photographed and collected from the forestry area of Karadeniz Technical University, Trabzon, Turkey. Texture, color changes of basidiomata, and some ecological features were noted at the collection site. Basidiomata were collected from the ground with a small garden shovel, put in separate paper bags, brought to the laboratory within polyethylene bags, placed on radiator, and dried for future microscopic study at the Fatih Faculty of Education of Karadeniz Technical University according to Clémençon (2009). For the microscopy, dried basidiomata were sectioned under a Zeiss Stemi 2000-C microscope and the sections were mounted in dilute ammonia and potassium hydroxide solution, stained with Congo red, and examined under a Zeiss Axio Imager A2 trinocular microscope. Melzer's reagent was used to check amyloidity of spore walls and the images were obtained with the Zeiss Axiocam 105 camera equipped with the Imager software program.

The following abbreviations are used: L = number of lamellae reaching the stipe, l = number of lamellulae between each pair of lamellae, Q = the quotient of length and width of the spores in side view; Qm = average quotient, n = number of measured cells.

### 2.2. DNA extraction, PCR amplification, and sequencing

Total DNA was extracted from dried specimens (Table). The protocols of Vizzini et al. (2016a) were followed for DNA extraction, PCR, and sequencing. Primer pairs ITS1F-ITS4 (White et al., 1990; Gardes and Bruns, 1993) and LR0R and LR5 (Vilgalys and Hester, 1990) were used to amplify and sequence the nrITS and nrLSU regions, respectively.

DNA extraction and PCR amplification were performed by ALVALAB (Oviedo, Spain). Sequencing was performed by MACROGEN (Seoul, Republic of Korea). Chromatograms were checked for putative reading errors, and those were corrected. The sequences are deposited in GenBank (http://www.ncbi.nlm.nih.gov/genbank/) and their accession numbers are reported in the Table.

### 2.3. Sequence alignment, data set assembly, and phylogenetic analysis

The sequences obtained in this study (Table) were checked and assembled using Geneious v.5.3 (Drummond et al., 2010). Based on BLASTn results, preliminary phylogenetic analysis, and outcomes of recent molecular studies on *Rhodocybe* sensu lato (Co-David et al., 2009, Kluting et al., 2014, Morgado et al., 2016), sequences were retrieved from the GenBank and UNITE (Kõljalg et al., 2013; unite.ut.ee/) databases for comparative analysis. Two separate phylogenetic analyses (based on nrITS and nrLSU sequences) were carried out. Alignments were generated for each ITS and LSU data set using MAFFT (Katoh et al., 2002) with default conditions for gap openings and gap extension penalties. Alignments were then imported into MEGA 6.0 (Tamura et al., 2013) for manual adjustment. The best-fit substitution model for each alignment was estimated by both the Akaike information criterion and the Bayesian information criterion with jModelTest 2.0 (Darriba et al., 2012) to provide a substitution model for

**Table.** Collections newly sequenced in this study.

| Species | GenBank acc. number | | Source, date, and country |
|---|---|---|---|
| | nrITS | nrLSU | |
| *Rhodocybe asanii* | KX834263 | KX834264 | KATO Fungi 3659 (holotype), 05/11/2015, Turkey |
| *Rhodocybe asanii* | KX834265 | — | KATO Fungi 3657 (paratype), 05/11/2015, Turkey |
| *Rhodocybe asyae* | KX834266 | KX834267 | KATO Fungi 3640 (holotype), 01/11/2015, Turkey |
| *Rhodocybe asyae* | KX834268 | — | KATO Fungi 3653 (paratype), 02/11/2015, Turkey |
| *Rhodocybe gemina* | — | KX834269 | KATO Fungi 2658, 13/08/2009, Turkey |

the alignment. The GTR + Γ model was chosen for both the alignments. *Rugosomyces* (*Calocybe*) *carneus* (AF357028, AF223178) and *Lyophyllum leucophaeatum* (AF357032, AF223202) were chosen as outgroup taxa for both the nrITS and nrLSU data sets.

Maximum likelihood (ML) analyses were performed to find phylogenetic relationships. ML analysis was performed with RAxML v.7.3.2 (Stamatakis, 2006) with 1000 bootstrap replicates (Felsenstein, 1985) using the GTRGAMMA algorithm to perform a tree inference and search for optimal topology. Support values from bootstrapping runs (MLB) were mapped on the globally best tree using the "-f a" option of RAxML and "-x 12345" as a random seed to invoke the novel rapid bootstrapping algorithm. ML analysis was run on the CIPRES Science Gateway web server (Miller et al., 2010). Only MLB values over 70% are indicated in the resulting trees (Figures 1 and 2). Branch lengths were estimated as mean values over the sampled trees.

## 3. Results

### 3.1. Molecular results

In both ITS and LSU phylogenies (Figures 1 and 2), our two new species occupy a distinct position and form a well-supported clade (MLB = 100%) together with other species of sect. *Rufobrunnea* (*R. gemina* in the ITS analysis; *R. gemina*, *R. pseudopiperita*, and *R. lateritia* in the LSU analysis).

### 3.2. Taxonomy

#### 3.2.1. *Rhodocybe asanii* E. Sesli & Vizzini, sp. nov. (Figures 3 and 4)

**MycoBank:** MB817505

##### 3.2.1.1. Diagnosis

Distinguished by a tricholomatoid, light ivory to beige red, convex to plane or irregular, fragile, 20–45 mm broad pileus; adnexed to sinuate, whitish to reddish beige lamellae (more reddish when injured); a pruinose, 25–40 × 5–15 mm stipe; 5.3–6.3 × 3.5–4.5 µm (on average, 5.8 × 4.1 µm), ellipsoid to broadly ellipsoid, weakly angular, warty basidiospores, 20–30 × 7–8 µm, 2–4-spored basidia, and unique ITS and LSU sequences.

**Holotype:** TURKEY, Trabzon Province, Karadeniz Technical University campus area, under *Pinus pinea* L. among pine needles and grass, 40°59′42.46″N, 39°46′16.22″E, 93 m alt., 5 November 2015, E. Sesli, KATO Fungi 3659.

**Etymology:** The new species is named in honor of the Turkish mycologist Prof Dr Ahmet Asan, who made great efforts on behalf of mycology in Turkey.

Basidiomata tricholomatoid to collybioid, very fragile, slightly hygrophanous and hyphal system monomitic. Pileus 20–45 mm, convex to plane, sometimes irregular or saddle-shaped, umbo indistinct and wide; light ivory to beige red, wood color, reddish brown or dark brown from place to place when injured or old; slightly reddish with KOH, not blackening in ammonia solution; margin paler, sometimes irregular and wavy depending on growth conditions; surface dry, minutely felty-tomentose. Lamellae adnexed to sinuate, concolorous with the pileus surface or somewhat paler; moderately thick and close, very fragile, edge regular, L = 40–50, l = 2–5. Stipe 25–40 × 5–15 mm, cylindrical, sometimes slightly flattened and curved, usually enlarged towards the base, pruinose, fibrillose, whitish to beige, reddish brown or dark brown when handled or when old, the base with a large white-tomentose bulb covered with debris. Context thin, up to 4 mm thick at pileus center, fragile, gray to beige red. Odor and taste indistinct.

Basidiospores (4.3–)5.3–6.3(–6.8) × (3.4–)3.5–4.5(–4.9) µm (on average, 5.8 × 4.1 µm) (apiculus included) (n = 135), Q = 1.2–1.5, Qm = 1.4, colorless, with numerous internal guttules, ellipsoid to broadly ellipsoid and somewhat angular in profile view, obscurely bumpy, apiculus long, thin-walled and inamyloid. Basidia 20–30 × 7–8 µm, 2–4-spored (mostly 4-spored), sterigmata 2–7 µm long, slenderly clavate, without basal clamp, thin-walled. Basidioles similar to basidia, 14–29 × 3–7 µm, narrowly clavate, subfusoid, subcylindrical. Cheilocystidia, pleurocystidia, and pseudocystidia absent. Hyphae of the hymenophoral trama periclinal, irregularly intertwined, cylindrical, thin-walled, short-celled, 24–78 × 8–13 µm, composed of cylindrical repent hyphae, with yellow-brown shiny granular or spirally encrusting pigments. Pileipellis two layered, a thin narrow colorless layer consisting of 3–9 µm in diam. hyphae, overlying a multicelled layer of interwoven hyphae with granular and spirally pigment encrusted hyphae, 9–15 µm in diam. Pileus context composed of interwoven, cylindrical and enlarged hyphae, 4–15 µm in diam. Stipitipellis a cutis of cylindrical, irregularly intertwined, thin-walled, smooth, 4–15 µm wide hyphae. Caulocystidia absent. Clamp-connections absent.

##### 3.2.1.2. Habit, habitat, and distribution

Solitary to gregarious, between debris and grass, under coniferous trees (*Pinus* L., *Picea* A. Dietr., *Abies* Mill.). Most probably saprotrophic, fruiting in autumn. Known only from East Black Sea Region of Turkey from two different localities so far.

**Paratype:** TURKEY, Trabzon Province, Karadeniz Technical University, Faculty of Medicine campus area, under *Pinus silvestris* L. among pine needles, 40°59′27.19″N, 39°46′09.50″E, 157 m alt., 5 November 2015, E. Sesli, KATO Fungi 3657.

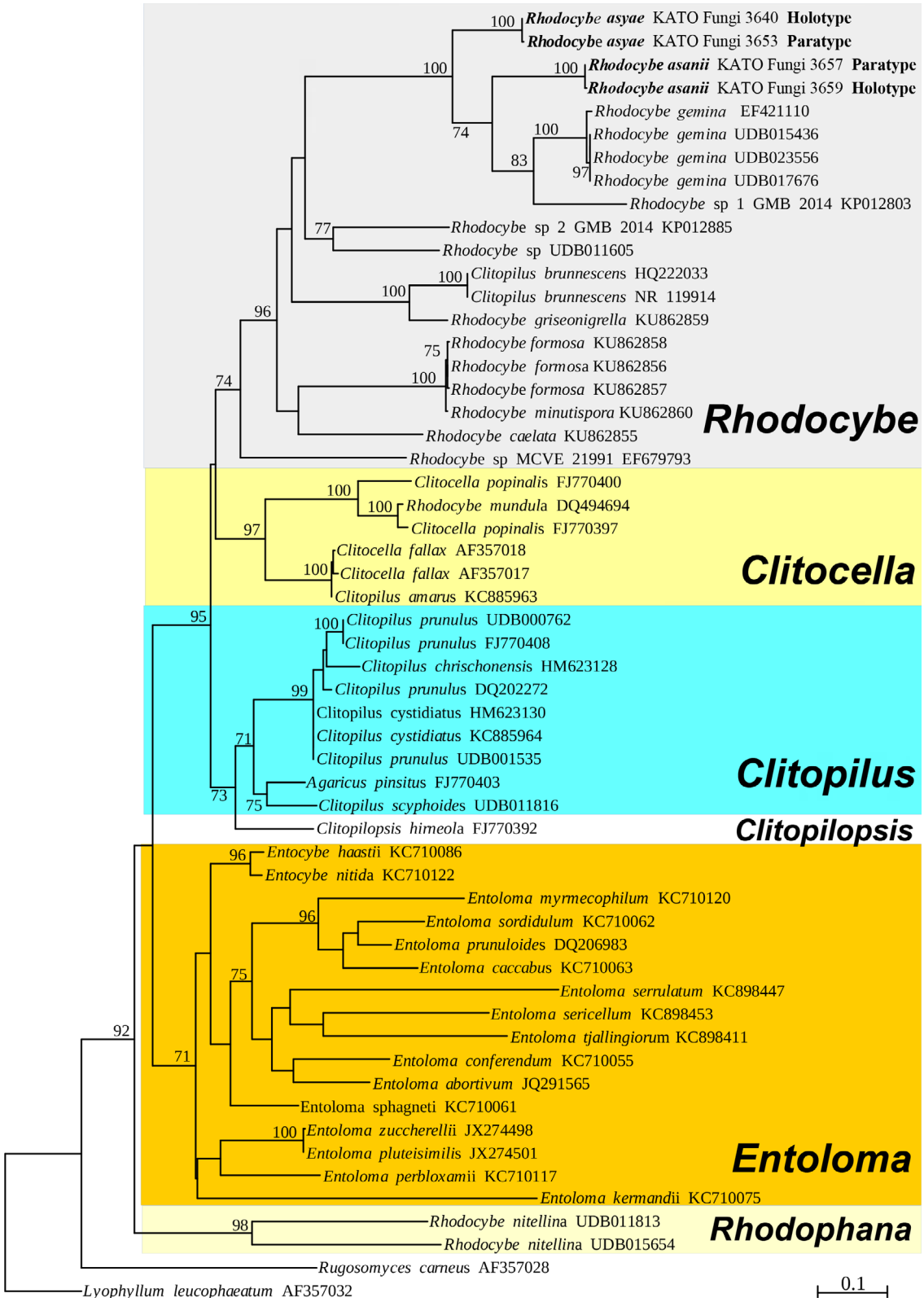


**Figure 1.** Maximum likelihood analysis based on the ITS sequences of Entolomataceae, with *Rugosomyces* (*Calocybe*) *carneus* and *Lyophyllum leucophaeatum* as outgroup taxa. MLB values ≥70% are shown on the branches. Newly sequenced collections are in bold.

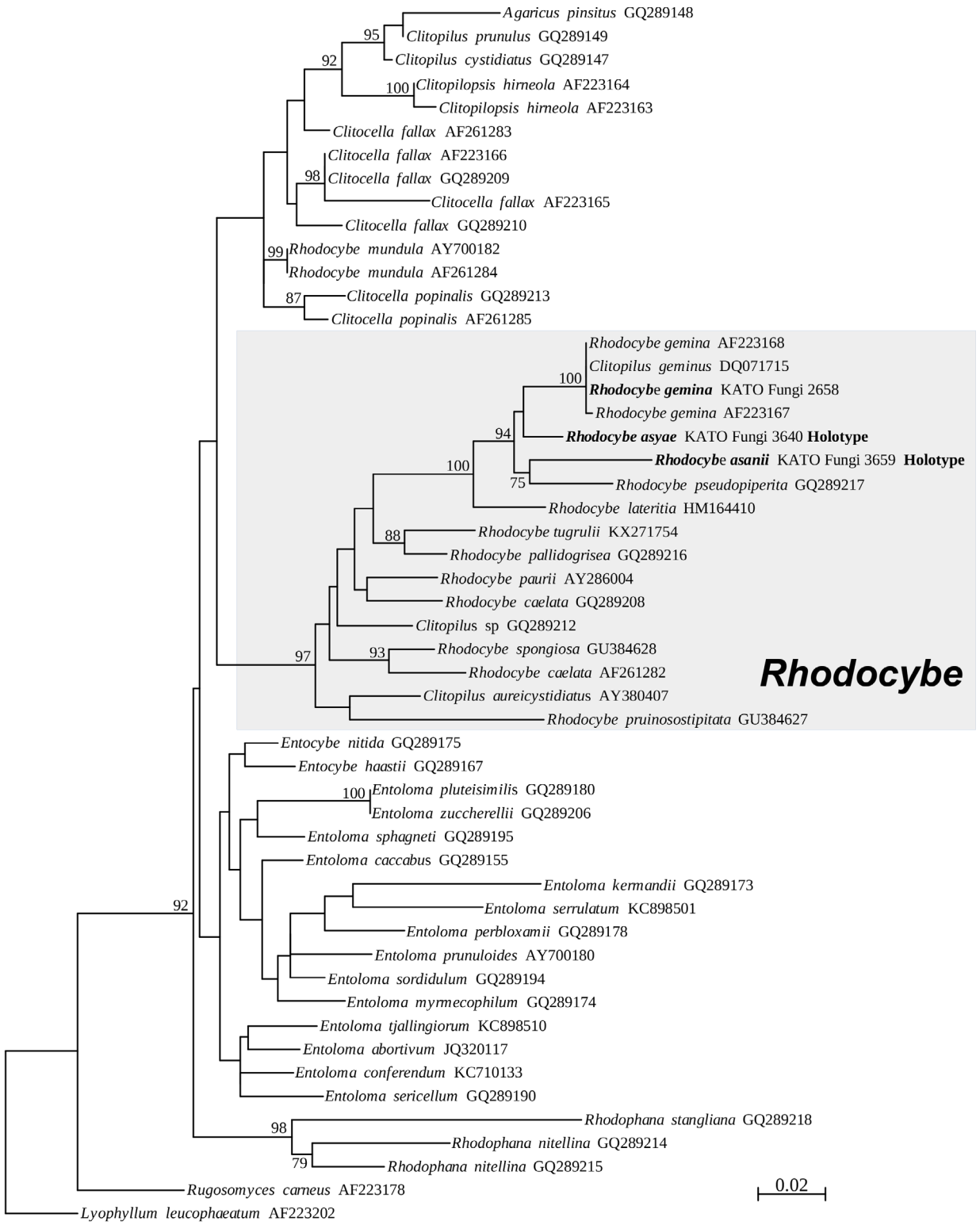


**Figure 2.** Maximum likelihood analysis based on the LSU sequences of Entolomataceae, with *Rugosomyces* (*Calocybe*) *carneus* and *Lyophyllum leucophaeatum* as outgroup taxa. MLB values ≥70% are shown on the branches. Newly sequenced collections are in bold.


**Figure 3.** *Rhodocybe asanii*: a–c. basidiomata (a–c in situ. a–b = Sesli 3659 holotype, c = Sesli 3657 paratype). Scale bars: a–c = 20 mm. Photos: a–c by E Sesli.

**3.2.2. *Rhodocybe asyae* E. Sesli & Vizzini, sp. nov. (Figures 5 and 6)**
**MycoBank:** MB817507

**3.2.2.1. Diagnosis**
Distinguished by a clitocyboid, rather small (10–30 mm), very thin-fleshed, salmon pink, smooth, dish shaped pileus; decurrent, whitish to light ivory or slightly reddish beige lamellae; a pruinose, 25–30 × 2–5 mm stipe; 5–7 × 4–5 µm, on average, 6.1 × 4.4 µm, ellipsoid to broadly ellipsoid, warty, slightly angular basidiospores, 20–30 × 6.5–8.5 µm, 2–4-spored basidia, versiform cheilocystidia, and unique ITS and LSU sequences.

**Holotype:** TURKEY, Trabzon Province, Karadeniz Technical University campus area, near *Pinus pinea*, among grass and pine needles, 40°59′42.87″N, 39°46′15.56″E, 92 m alt., 1 November 2015, E. Sesli, KATO Fungi 3640.

**Etymology:** The name was given in honor of Asya Sesli, the daughter of the first author.

Basidiomata clitocyboid, quite small compared to other species in the sect. *Rufobrunnea*, and hyphal system monomitic. Pileus 10–30 mm, thin, convex to plane when young, irregular, dish-, cup-, or broadly funnel-shaped and uplifted with age in mature, folded onto itself and lobed when very old; umbo wide and indistinct, salmon pink, paler towards the margin, reddish brown to darker when old or injured; margin irregular and wavy, lobed when old; slightly reddish with KOH, not blackening with ammonia solution; surface smooth, dry and bright.

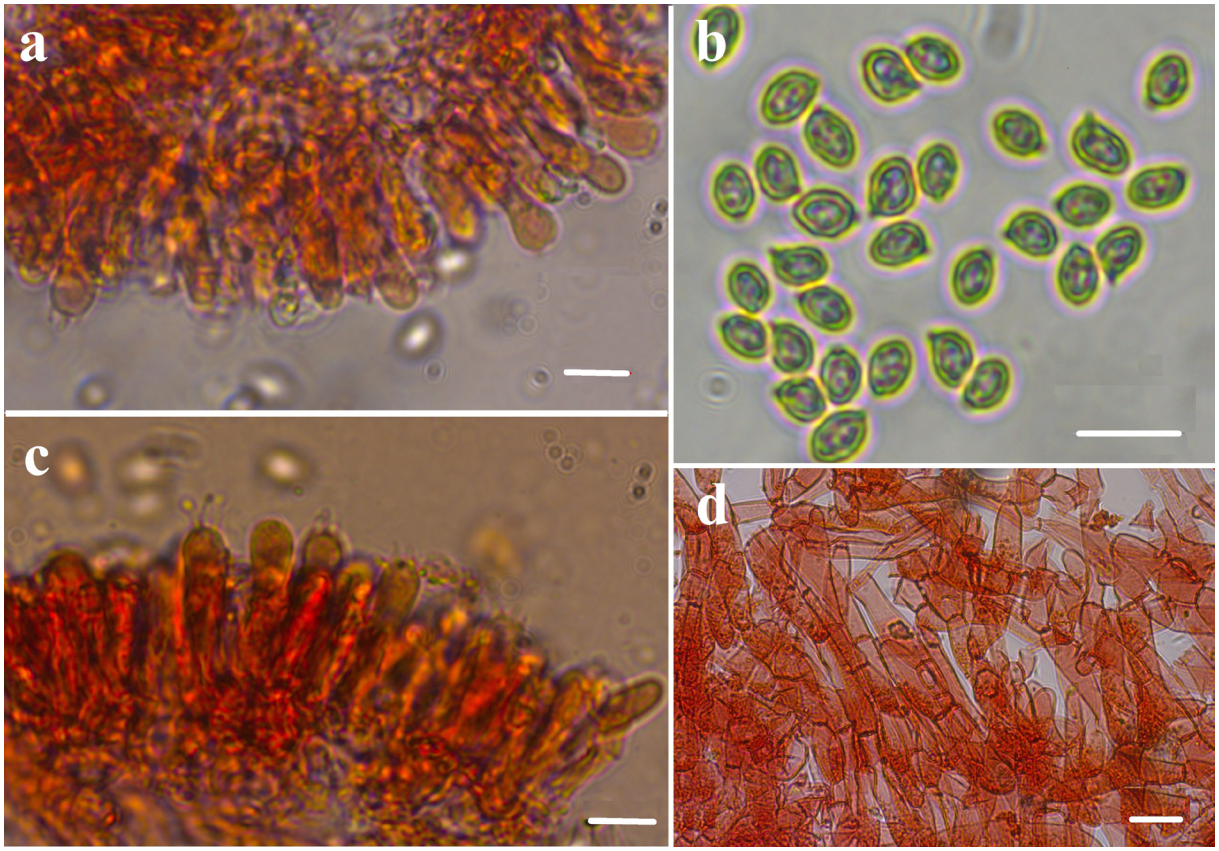


**Figure 4.** *Rhodocybe asanii*: a and c. basidia and basidioles (in ammoniacal Congo red), b. basidiospores (in Melzer's reagent), d. elements of the pileipellis (in ammoniacal Congo red). Scale bars: a–c = 10 µm, d = 20 µm. Photos by E Sesli.

Lamellae arcuate to decurrent, whitish, light ivory to beige red or slightly reddish beige, reddish brown when injured, thin, sometimes twisted, fragile, edge regular, sometimes with transverse rupture, L = 35–55, l = 1–3. Stipe 25–30 × 2–5 mm, cylindrical, intensely pruinose, typically tapering towards base, the base with white-tomentose bulb, generally curved, fibrous, flesh-colored, watery. Context very thin, even at the pileus center, white to gray-beige. Odor fruity. Taste indistinct.

Basidiospores (4.8–)5–7(–8) × 4–5(–5.5) µm, on average, 6.1 × 4.4 µm (apiculus included) (n = 125), Q = 1.1–1.4, Qm = 1.3, ellipsoid to broadly ellipsoid and somewhat angular in profile view, obscurely bumpy, colorless, apiculus long, thin-walled and inamyloid. Basidia 20–30 × 6.5–8.5 µm, 2–4-spored (mostly 2-spored), sterigmata 3–8 µm long, slenderly clavate, without basal clamp, thin-walled. Basidioles similar to basidia, 17–22 × 5–6 µm, slenderly clavate. Cheilocystidia rare, 20–30 × 4–6 µm, versiform, flexuous, thin-walled. Hyphae of the hymenophoral trama regular, cylindrical, thin-walled, 20–70 × 6–15 µm. Pileipellis two layered, a thin colorless layer of narrow cylindrical, 3–5 µm in diam. hyphae, overlying a multicelled layer of interwoven hyphae, 6–12 µm in diam., not encrusted but with sordid yellow cytoplasmatic pigment. Pileus context composed of interwoven, colorless, cylindrical, or slightly enlarged hyphae, 6–11 µm in diam. Stipitipellis a cutis of cylindrical, parallel, thin-walled, smooth, 7–16 µm wide hyphae. Caulocystidia absent. Clamp-connections absent.

#### 3.2.2.2. Habit, habitat and distribution

Solitary to gregarious near coniferous trees (*Pinus*, *Picea*, *Abies*), between pine needles and grass. Most probably saprotrophic, fruiting in autumn. Known only from East Black Sea Region of Turkey (two different localities) so far.

**Paratype:** TURKEY, Trabzon Province, Karadeniz Technical University campus area, on soil, near *Pinus pinea*, 40°59′27.34″N, 39°46′18.63″E, 144 m alt., 2 November 2015, E. Sesli, KATO Fungi 3653.

## 4. Discussion

Both species described and illustrated in this study, *Rhodocybe asanii* and *R. asyae*, belong to *Rhodocybe* sect. *Rufobrunnea* (Entolomataceae) because clamp-connections are absent and they show reddish beige, salmon pink, or reddish brown pileus, and adnate to decurrent lamellae (Baroni, 1981; Bas et al., 1988; Petersen


**Figure 5.** *Rhodocybe asyae*: a–c. basidiomata (a–c in situ. a–b = Sesli 3640 holotype, c = Sesli 3653 paratype). Scale bars: a–c = 15 mm. Photos: a–c by E Sesli.

and Vesterholt, 1990; Knudsen and Vesterholt, 2008). The two new species are different from each other by some morphological features. *Rhodocybe asanii* is characterized by a collybioid to tricholomatoid habit, reddish beige, convex, 20–45 mm pileus, adnexed to sinuate lamellae, and absence of cheilocystidia, whereas *R. asyae* has a clitocyboid, salmon pink, dish-shaped, smaller (10–30 mm) pileus, decurrent lamellae, and versiform, thin-walled cheilocystidia.

According to the results of the molecular analyses (Figures 1 and 2) and morphological studies of the new species we found that the most closely related species are *Rhodocybe gemina* [= *Rhodocybe truncata* (Schaeff.) Singer], *R. pseudopiperita* T.J. Baroni & G.M. Gates, and *R. lateritia* T.J. Baroni & G.M. Gates.

*Rhodocybe gemina* differs considerably in having a larger (30–100 mm), thick-fleshed pileus, broadly adnate to subdecurrent lamellae, a 40–70 × 9–20 mm stipe (Figure 7), a farinaceous to aromatic odor, and subglobose to broadly ellipsoid, 5–6.5(–7) × 4–5(–5.5) µm basidiospores (Baroni, 1981; Breitenbach and Kränzlin, 1995; Knudsen and Vesterholt, 2008). *Rhodocybe pseudopiperita* described from Tasmania has basidiospores different (ellipsoid or subamygdaliform or amygdaliform) from those of both the newly described species and has developed pileocystidia. Additionally, it differs from *R. asyae* by the incurved adnate or subdecurrent lamellae and from *R. asanii* by the smaller (24–47 mm), clitocyboid to collybioid habit, buff pink and weakly umbonate pileus (Baroni and Gates, 2006; Noordeloos and Gates, 2012). The other allied species

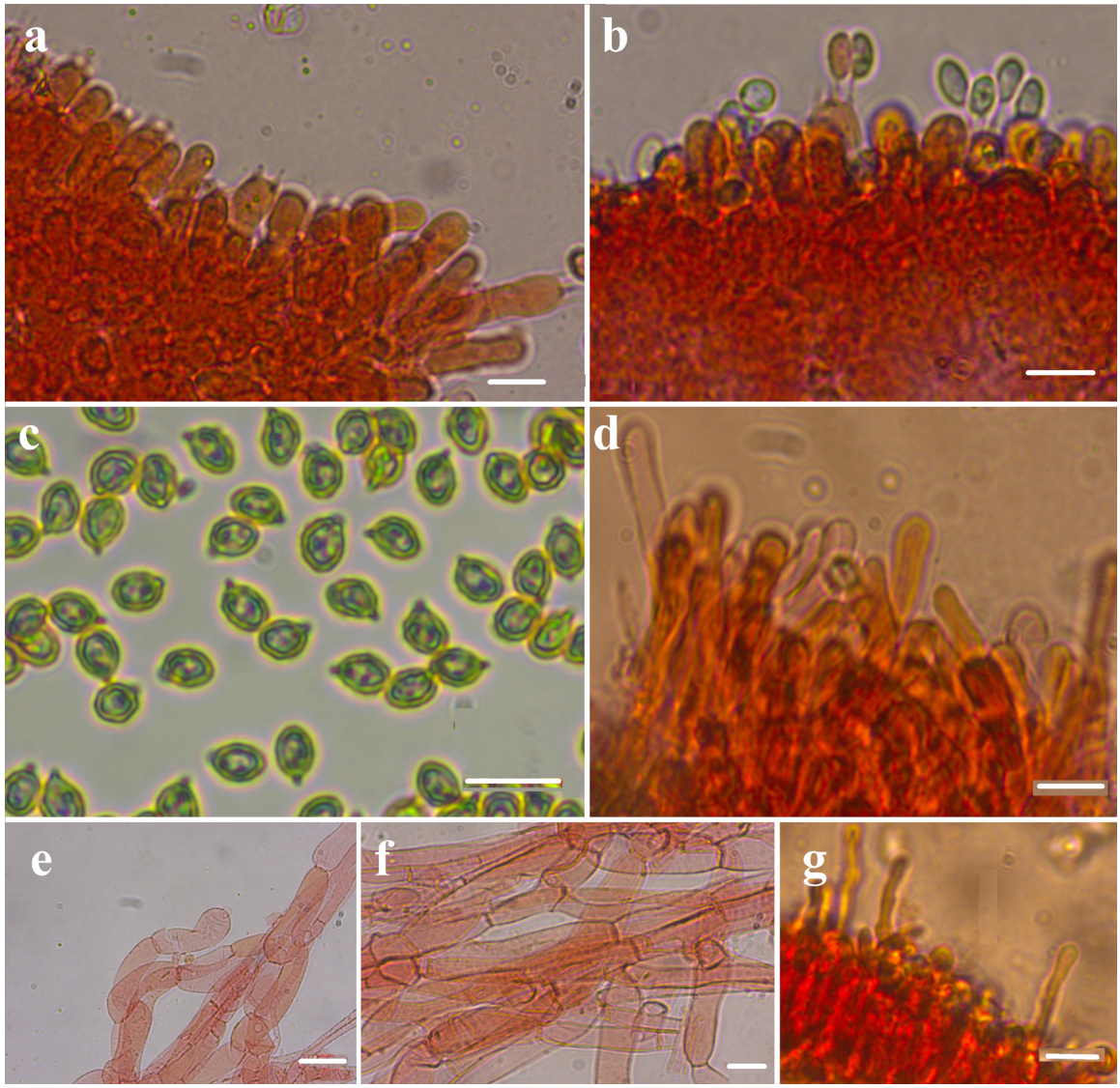


**Figure 6.** *Rhodocybe asyae*: a–b. basidia and basidioles (in ammoniacal Congo red), c. basidiospores, d and g. cheilocystidia, e. tramal hyphae, f. elements of the pileipellis. (a, b, d, e, f, g in ammoniacal Congo red, c in Melzer's reagent). Scale bars: a–d, f–g = 10 µm, e = 20 µm. Photos by E Sesli.

described from Tasmania, *R. lateritia*, is circumscribed by a burnt sienna or reddish brown cup-shaped pileus, 40–120 mm broad, large, 5.5–11 × 4.5–7.5 µm basidiospores, cylindrical-flexuous or fusiform to lageniform, branched, septate, 30–70(–80) × 3–7 µm cheilocystidia, and ascending, cystidioid elements (pileocystidia) in the pileipellis (Baroni and Gates, 2006; Noordeloos and Gates, 2012).

Finally, the North American *R. roseiavellanea* is distinguished by a robust stature (pileus 35–70 mm broad and stipe 30–60 × 10–25 mm), and large ellipsoid to subamygdaliform spores, (6.5–)7–9(–10) × (4.0–)5.0–5.5(–7.0) µm (Baroni, 1981).

We prepared a simple key including the newly described *Rhodocybe* species and the other rhodocyboid taxa known from Turkey to date. The key is in accordance with Baroni (1981), Bas et al. (1988), Hansen and Knudsen (1992), Breitenbach and Kränzlin (1995), and Knudsen and Vesterholt (2008).

**4.1. Key to the *Rhodocybe* s.l. species known from Turkey**

1 Clamp-connections present, basidiospores 6–9 × 4–5 µm ..... ***Rhodophana nitellina*** (Solak et al., 2015)

1* Clamp-connections absent ..... 2

2 Basidioma light ivory to beige red, lamellae adnexed to sinuate, basidiospores 5.3–6.3 × 3.5–4.5 µm ..... ***Rhodocybe asanii***

2* Basidioma with different colors, lamellae broadly adnate, more or less decurrent ..... 3

**Figure 7.** *Rhodocybe gemina*. Basidiomata in field (KATO Fungi 2658). Scale bar = 20 mm. Photo by E Sesli.

3 Cheilocystidia present ..... 4
3* Cheilocystidia absent ..... 6
4 Cheilocystidia 1–4 septate, pileus and lamellae grayish, pileus often depressed or umbilicate at center, margin crenulated, spores on average more than 7 µm long ..... ***Clitopilopsis hirneola*** (Solak et al., 2015)
4* Cheilocystidia aseptate to uniseptate, pileus and lamellae salmon pink, reddish brown, pileus not depressed, margin not crenulated, spores on average shorter than 7 µm ..... 5
5 Basidioma tricholomatoid, pileus 30–100 mm broad, stipe 9–20 mm thick, lamellae broadly adnate, odor farinaceous-aromatic ..... ***Rhodocybe gemina*** (Watling and Gregory, 1977)
5* Basidioma clitocyboid, pileus 10–30 mm broad, stipe 2–5 mm thick, lamellae arcuate to decurrent, odor fruity ..... ***Rhodocybe asyae***
6 Pileus white to pale creamy ..... ..... ***Clitocella fallax*** (Kaya, 2001)
6* Pileus gray to gray-brown ..... 7
7 Pileus whitish gray to dirty yellowish, taste bitter, basidiospores irregularly ellipsoid to subamygdaliform, distinctly pustulate, caulocystidia present ..... ..... ***Clitocella popinalis*** (Watling and Gregory, 1977; Sesli and Baydar, 1996)
7*Pileus gray to beige, taste mild, basidiospores subglobose to broadly ellipsoid, not distinctly pustulate but sometimes obscurely bumpy, caulocystidia absent ..... ***Rhodocybe tugrulii*** (Vizzini et al, 2016a)

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