



## New bryophilic *Pyronemataceae* records for Turkish *Pezizales* from Gaziantep province

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### Türkiye *Pezizales*'leri için Gaziantep'ten yeni briyofilik *Pyronemataceae* kayıtları

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**Abstract:** This study was based on fourteen bryophilous *Pyronemataceae* species. Thirteen of them (*Inermisia gyalectoides* (Svrček & Kubička) Dennis & Itzerott, *Lamprospora carbonicola* Boud., *Lamprospora dictydiola* Boud., *Lamprospora miniata* De Not., *Octospora areolata* (Seaver) Caillet & Moyne, *Octospora axillaris* (Nees) M.M. Moser, *Octospora coccinea* (P. Crouan & H. Crouan) Brumm., *Octospora excipulata* (Clem.) Benkert, *Octospora gemmicola* Benkert, *Octospora musci-muralis* Graddon, *Octospora orthotrichi* (Cooke & Ellis) K.B. Khare & V.P. Tewari, *Octospora polytrichi* (Schumach.) Caillet & Moyne and *Octospora rustica* (Velen.) J.Moravec) are given as new records for the macromycota of Turkey. *Inermisia* and *Lamprospora* are new at genus level. New localities are given for the 14<sup>th</sup> species, *Octospora leucoloma* Hedw. Brief descriptions about the macroscopic and microscopic characters of the species and their photographs are provided.

**Key words:** Biodiversity, bryoparasitic fungi, *Pyronemataceae*, new records, Turkey

**Özet:** Bu çalışma 14 briyofilik *Pyronemataceae* türü üzerinde temellendirilmiştir. Bunlardan 13 tanesi (*Inermisia gyalectoides* (Svrček & Kubička) Dennis & Itzerott, *Lamprospora carbonicola* Boud., *Lamprospora dictydiola* Boud., *Lamprospora miniata* De Not., *Octospora areolata* (Seaver) Caillet & Moyne, *Octospora axillaris* (Nees) M.M. Moser, *Octospora coccinea* (P. Crouan & H. Crouan) Brumm., *Octospora excipulata* (Clem.) Benkert, *Octospora gemmicola* Benkert, *Octospora musci-muralis* Graddon, *Octospora orthotrichi* (Cooke & Ellis) K.B. Khare & V.P. Tewari, *Octospora polytrichi* (Schumach.) Caillet & Moyne ve *Octospora rustica* (Velen.) J.Moravec) Türkiye makromikotası için yeni kayıttır. *Inermisia* ve *Lamprospora* cins düzeyinde yenidir. On dördüncü türe (*Octospora leucoloma* Hedw.) ilişkin yeni lokaliteler verilmiştir. Türlerin makroskopik ve mikroskopik karakterlerine ilişkin kısa betimlemeleri ve fotoğrafları verilmiştir.

**Anahtar kelimeler:** Biyoçeşitlilik, bryoparazitik mantarlar, *Pyronemataceae*, yeni kayıtlar, Türkiye

## 1. Introduction

Fungi are heterotrophic organisms growing on either dead organic material or on different organs of some other living organisms. Those growing on gametophytic or sporophytic organs of bryophytes are usually known as bryophilous fungi. Within the order *Pezizales* the members of the genera *Filicupula* Y.J.Yao & Spooner, *Hiemsia* Svrček, *Inermisia* Rifai, *Lamprospora* De Not., *Neottiella* (Cooke) Sacc., *Octospora* Hedw., *Octosporella* Döbbeler, *Octosporopsis* U.Lindem. & M.Vega and *Ramsbottomia* W.D.Buckley are known to have bryophilous mode of life (Felix, 1988; Benkert, 2007; Kirk et al., 2008). Except the genus *Filicupula* all of them are currently positioned in *Pyronemataceae*.

Since they require similar environmental conditions, moss and fungus could also live together. Bryophytes are capable of supporting fungal growth by providing a good microenvironment (Stephenson & Studlar 1985). Some fungi within the order *Pezizales*, especially the members of the genera *Octospora*, prefer small, acrocarpous mosses as substrates that can live in unfavorable conditions like a rocky or hot and frequently dry surfaces (Hughes, 1982). Though research on bryoparasitic species has a long tradition in some European countries (Egertova et al., 2015) and the presence of about 300 species of ascomycetes growing on the gametophytes of mosses or hepatics were reported (Döbbeler, 1997), bryophilous fungi has received almost no attention in Turkey. According to the current checklists (Sesli and Denchev,

2014; Solak et al., 2015) 31 basidiomycete species growing on or around the bryophytes are known to exist in Turkey. But only six bryophilous ascomycete species, *Marcelleina persoonii* (P.Crouan & H.Crouan) Brumm. (*Pezizaceae*) (Yılmaz et al., 1997), *Neottiella rutilans* (Fr.) (Akata and Kaya, 2013), *Octospora itzerottii* Benkert (Uzun et al., 2017), *O. leucoloma* Hedw. (Çolak and Kaygusuz, 2017), *Scutellinia trechispora* (Berk. & Broome) Lambotte (*Pyronemataceae*) (Kaya et al., 2016) and *Pseudoplectania sphagnophila* (Pers.) Kreisel (*Sarcosomataceae*) (Türkoğlu and Yağız, 2012), have so far been recorded from Turkey yet. Compared to 81 octosporoid fungi existing in Europe (Benkert, 2007), there is still much to be done in Turkey.

The work aims to make a contribution to the mycobiota of Turkey by adding new bryophilous ascomycete species.

## 2. Materials and methods

Macrofungi samples were collected from the different localities within the boundaries of Gaziantep province between 2013 and 2017. Geographic positions were noted together with their necessary morphological and ecological characteristics, and they were photographed in their natural habitats. Olympus SZX7 trinocular stereomicroscope was used for some macrostructural properties of smaller fruit bodies. Nikon eclipse Ci-S trinocular light microscope, DS-Fi2 digital camera and Nikon DS-L3 displaying apparatus were used for microstructural investigation and photographing. Identification of the samples were performed with the help

of Seaver (1912, 1914, 1942), Le Gal (1940), Svrček and Kubička (1961), Dougoud and Roth (1972), Dennis and Itzerott (1973), Khare and Tewari (1975), Khare (1976, 2003), Breitenbach and Kränzlin (1984), Senn-Irlet (1988), Wang and Kimbrough (1992), Schumacher (1993), Fox et al. (1994), Benkert (1987, 1997, 1998), Yao and Spooner (1996), Hansen and Pfister (2006), Medardi (2006), Eckstein and Eckstein (2009, 2013), Eckstein (2014), Pradhan et al. (2013), Wieschollek (2013), Beug et al. (2014), Eckstein et al., (2014) and Egertova et al., (2015).

### 3. Results

The systematics of the taxa are given in accordance with Cannon and Kirk (2007), Kirk et al. (2008), and the Index Fungorum (www.indexfungorum.org; accessed 02 November 2017). The taxa are listed in alphabetical order with brief descriptions, habitats, localities, collection dates and accession numbers.

*Ascomycota* Whittaker

*Pezizales* J. Schröt.

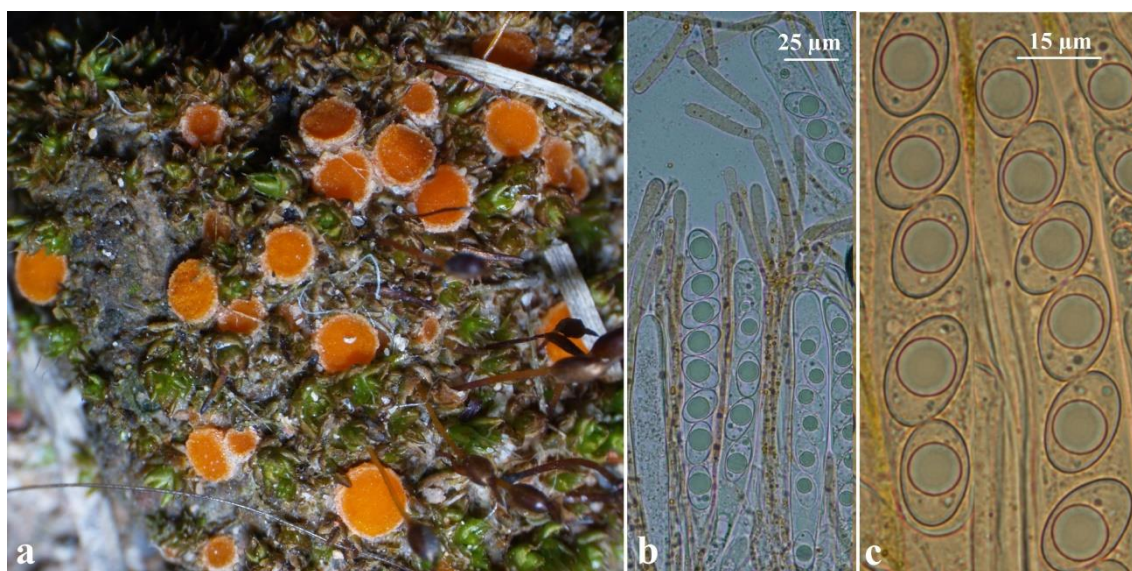
### *Pyronemataceae* Corda

3.1. *Inermisia gyalectoides* (Svrček & Kubička) Dennis & Itzerott, Kew Bull. 28(1): 22 (1973) (Figure 1)

**Syn.** *Octospora gyalectoides* Svrček & Kubička.

**Macroscopic and microscopic features:** Apothecia 1-2 mm in diameter, more or less convex, pale orange to orange, sometimes with lighter margin. Asci 180-240 × 15-18 μm, cylindrical, eight spored, spores uniseriate. Paraphyses cylindrical, enlarged towards the apex, some forked above. Spores 16.5-22 × 9-12.5 μm, ellipsoid, smooth, hyaline, with a large oil drop. *Inermisia gyalectoides* grows in association with scattered small mosses, *Bryum argenteum* Hedw., *Funaria hygrometrica* Hedw., *Pterygoneurum ovatum* (Hedw.) Dixon and *Pottia* (Reichenbach) Fűrnrrohr sp. (Dennis and Itzerott, 1973; Benkert, 2007; Eckstein and Eckstein, 2009).

**Specimen examined:** Gaziantep, Şehitkâmil, city cemetery, on *Pterygoneurum ovatum*, 37°04'N, 37°23'E, 845 m, 04.01.2015, K.11164; Öğümsöğüt village, 37°06'N, 37°18'E, 1020 m, 07.03.2015, K.11409.



**Figure 1.** *Inermisia gyalectoides*: a- ascocarps, b- asci and paraphyses, c- ascospores.

3.2. *Lamprospora carbonicola* Boud., Hist. Class. Discom. Eur. (Paris): 68 (1907) (Figure 2)

**Syn.** *Barlaeina carbonicola* (Boud.) Sacc. & Traverso; *Octospora carbonicola* (Boud.) Yei Z. Wang.

**Macroscopic and microscopic features:** Apothecia 1-4 mm in diameter, broad, partly submerged in the soil among shoots of its host, hymenium orange to bright red, with conspicuous membranaceous margin. Asci 180-260 × 16-19 μm, cylindrical, tapering towards the base. Paraphyses straight, septate, enlarged at the tip with orange, granular content. Spores 13-16 μm, globose to subglobose, with a ridged ornamentation forming a fine-meshed reticulum, and a large oil drop. *Lamprospora carbonicola* grows among the moss *Funaria* Hedwig, *Tortula* Hedw. (Wang and Kimbrough, 1992), *Pholia* Hedw., *Barbula* Hedw. sp. (Schumacher, 1993) on moist, burnt sandy gravelly forest floor in shade of trees (Pradhan et al., 2013).

**Specimen examined:** Gaziantep, Nizip, Sekili village, on cemetery wall with *Funaria hygrometrica* Hedw., 36°58'N, 37°40'E, 600 m, 28.02.2015, K.11340; Şehitkâmil, central city cemetery, 37°04'N, 37°23'E, 845 m, 06.03.2015, K.11383; Oğuzeli, cemetery, 36°57'N, 37°30'E, 670 m, 08.03.2015, K.11427; Nurdağı, Atalar village, 37°08'N, 36°54'E, 985 m, 22.03.2015, K.11497.

3.3. *Lamprospora dictydiola* Boud., Hist. Class. Discom. Eur. (Paris): 68 (1907) (Figure 3)

**Syn.** *Barlaeina dictydiola* (Boud.) Sacc. & Traverso; *Octospora dictydiola* (Boud.) Caillet & Moyne.

**Macroscopic and microscopic features:** Apothecia 1-2 mm in diameter, broad, shallow cupulate to turbinate, partly submerged among shoots of its host, hymenium orange to orange red, with prominent membranaceous margin. Asci 170-200 × 17-19 μm, cylindrical, gradually tapering towards the base. Paraphyses straight, sparsely branched from below, enlarged at the tip with orange, granular content. Spores 14-16 × 13.5-15.5 μm, globose to



subglobose, with a ridged ornamentation forming a fine-meshed reticulum, and a large oil drop. *Lamprospora dictydiola* was reported to grow on vertical parts of old garden wall among the moss *Tortula muralis* L. ex Hedw. (Benkert and Brouwer, 2004).

**Specimen examined:** Gaziantep, Şehitkâmil, central city cemetery, on *Tortula muralis*, 37°04'N, 37°23'E, 860 m, 27.03.2015, K.11503; Islahiye, Tandır village, Huzurlu high plateau, near the road, 36°58'N, 36°30'E, 1410 m, K.11899.



**Figure 2.** *Lamprospora carbonicola*: a- ascocarps, b,c- asci and paraphyses, d- ascospores.



**Figure 3.** *Lamprospora dictydiola*: a- ascocarps, b- asci and paraphyses, c- ascospores.

3.4. *Lamprospora miniata* De Not., Comm. Soc. crittog. Ital. 1(fasc. 5): 388 (1864) (Figure 4)

Syn. *Ascobolus miniatus* P. Crouan & H. Crouan; *Barlaea crouanii* (Cooke) Masee; *Barlaea miniata* (De Not.) Sacc.; *Barlaeina miniata* (De Not.) Sacc. & Traverso; *Crouania crouanii* (Cooke) Lambotte; *Crouania miniata* (De Not.) Fuckel; *Humaria crouanii* (Cooke) Quél.; *Lamprospora crouanii* (Cooke) Seaver, *Lamprospora crouanii* (Cooke) Seaver f. *crouanii*; *Lamprospora crouanii* f. *magnihyphosa* J. Moravec; *Lamprospora miniata* De Not.; *Lamprospora miniata* De Not. f. *miniata*; *Lamprospora miniata* f. *parvispora* Benkert; *Lamprospora miniata* De Not. var. *miniata*; *Lamprospora miniata* var. *parvispora* Benkert; *Lamprospora miniata* var. *ratisbonensis* Benkert; *Octospora miniata* (De Not.) Caillet & Moyne; *Peziza crouanii* Cooke.

**Macroscopic and microscopic features:** Apothecia 1-5 mm in diameter, subglobose at first, expanding and becoming concave to almost plane with a slightly elevated margin when mature. Bright red, margin lighter. Asci 180-260 × 18-22 µm, cylindrical, eight spored, spores uniseriate. Paraphyses cylindrical, somewhat thickened above. Spores 15-17 µm in diameter, globose, hyaline, with a large oil drop and ridged ornamentation when mature. *Lamprospora miniata* grows in association with *Pottia bryoides* (Dicks.) Mitt. and *Phascum cuspidatum* Schreb. ex Hedw. (Eckstein and Eckstein, 2009).

**Specimen examined:** Gaziantep, Nizip, Sekili village, cemetery, on soil with *Phascum cuspidatum*, 36°58'N, 37°40'E, 600 m, 14.12.2014, K.11110; Oğuzeli, cemetery, 36°57'N, 37°30'E, 670 m, 05.04.2015, K.11664.



3.5. *Octospora areolata* (Seaver) Caillet & Moyne, Bull. trimest. Soc. mycol. Fr. 96(2): 199 (1980) (Figure 5)

**Syn.** *Lamprospora areolata* Seaver; *Lamprospora areolata* Seaver var. *areolata*; *Octospora areolata* (Seaver) Yei Z. Wang.

**Macroscopic and microscopic features:** Apothecia 0.5-1 mm in diameter, discoid to cupulate, hymenium orange red, light yellow when dry, margin slightly raised, outer surface darker and closely attached with moss. Asci 190-

240 × 18-21 μm, clavate-cylindrical, eight spored, spores uniseriate. Paraphyses subclavate, septate, slightly enlarged at apex up to 6-7 μm. Spores 14-16 μm excluding ornamentation, globose, hyaline, marked with high ridges of 3-4 × 0.8 μm. *Octospora areolata* grows on soil among mosses (Wang and Kimbrough, 1992).

**Specimen examined:** Gaziantep, Nurdağı, Olucak village, on *Syntrichia ruralis* (Hedw.) F.Weber & D.Mohr, 37°10'N-36°40'E, 950 m, 10.04.2015, K.11684.



**Figure 4.** *Lamprospora miniata*: a- ascocarps, b- asci and paraphyses, c- ascospores.



**Figure 5.** *Octospora areolata*: a- ascocarps, b- asci and paraphyses, c- ascospores.

3.6. *Octospora axillaris* (Nees) M.M. Moser, in Gams, Kl. Krypt.-Fl., Edn 3 (Stuttgart) 2a: 110 (1963) (Figure 6)

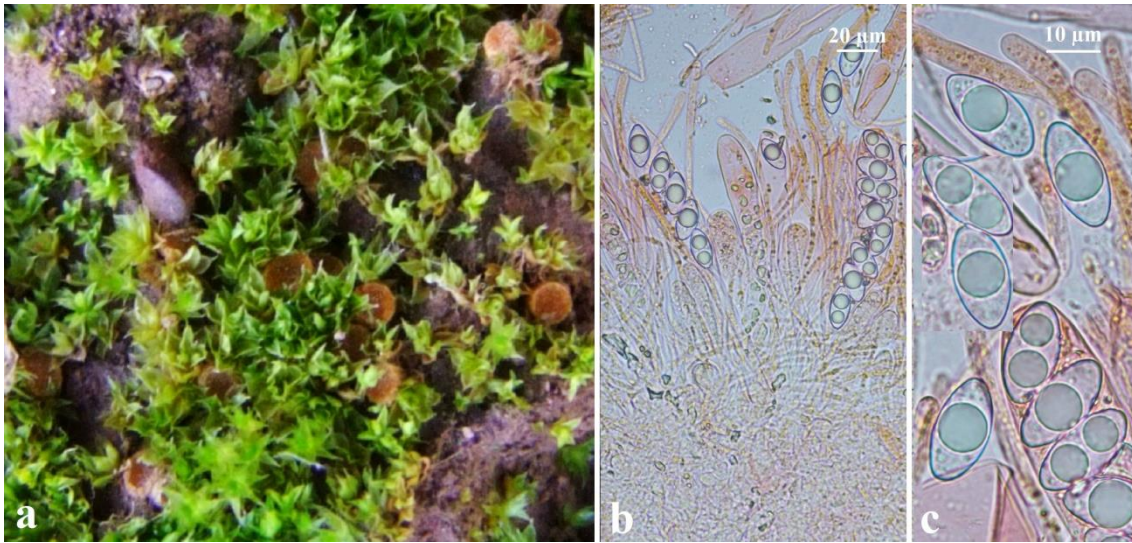
**Syn.** *Helotium axillaris* (Nees) Boud.; *Humaria axillaris* (Nees) Sacc.; *Humaria carneola* (Saut.) Sacc.; *Humaria sublutea* Velen.; *Humarina axillaris* (Nees) Seaver; *Leucoloma axillaris* (Nees) Fückel; *Octospora axillaris* (Nees) M.M. Moser var. *axillaris*; *Octospora axillaris* var. *dennisii* Itzerott; *Octospora axillaris* var. *tetraspora* Benkert; *Octospora carneola* (Saut.) Dennis; *Octospora sublutea* (Velen.) Svřček; *Peziza axillaris* Nees; *Peziza carneola* Saut.

**Macroscopic and microscopic features:** Apothecia 0.5-2 (2.5) mm in diameter, flat to convex, sessile, orange. Asci 140-190 × 18-22 μm, cylindrical, eight spored, somehow tapered toward the base, spores usually uniseriate. Paraphyses filiform, enlarged toward the apex up to 7-8 μm. Spores 21-28 × 10-12 μm, ellipsoid, hyaline, smooth, usually with two large oil drops. *Octospora axillaris* was reported to grow on soil among *Barbula unguiculata* Hedw., *Entosthodon fascicularis* (Hedw.) Müll. Hal., *Pottia davalliana* (Sm.) C.E.O.Jensen, *Pottia lanceolata* (Hedw.) Müll.Hal. (Caillet and Moyne, 1989), *Phascum cuspidatum* Schreb. ex Hedw., *Syntrichia ruralis* (Hedw.) F.Weber & D.Mohr, *Tortula ruralis* (Hedw.) Gaertn.



(Dennis and Itzerott, 1973; Benkert, 2007; Eckstein and Eckstein, 2009), and on the protonema of *Dicranella heteromalla* (Hedw.) Schimp. (Itzerott, 1977).

**Specimen examined:** Gaziantep, Islahiye, Hanağzı village, on soil among *Ptychostomum donianum* (Grev.) Holyoak & N.Pedersen, 37°03'N-36°36'E, 625 m, 08.11.2014, K.10515; K.10517.



**Figure 6.** *Octospora axillaris*: a- ascocarps, b- asci and paraphyses, c- ascospores.

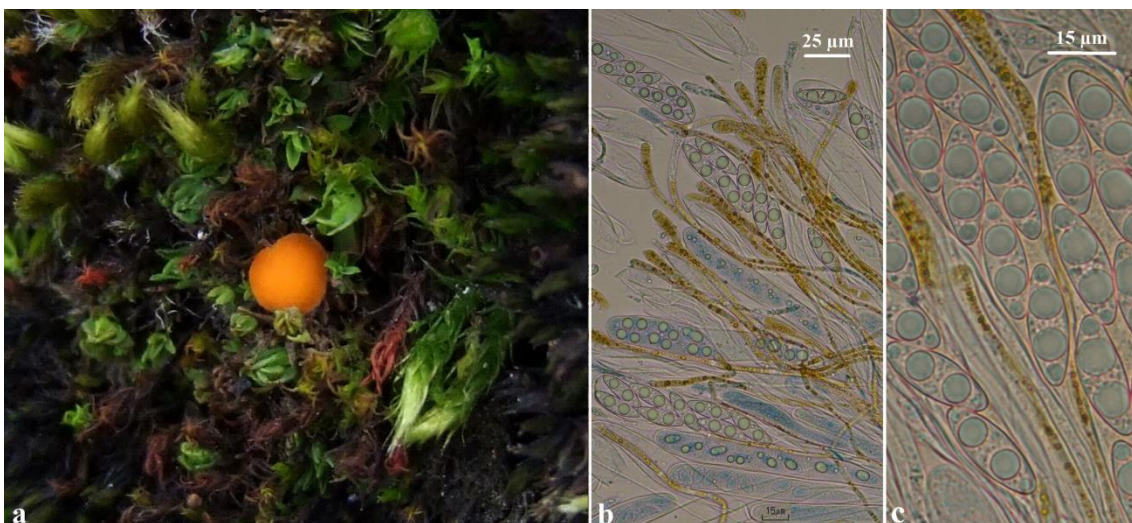
3.7. *Octospora coccinea* (P. Crouan & H. Crouan) Brumm., Persoonia, Suppl. 1: 213 (1967) (Figure 7)

**Syn.** *Ascobolus coccineus* P. Crouan & H. Crouan; *Byssonectria coccinea* (P. Crouan & H. Crouan) M. Torre; *Humaria coccinea* (P. Crouan & H. Crouan) Sacc.; *Humaria coccinea* var. *maritima* Grélet; *Humaria muralis* Quélet; *Humarina coccinea* (P. Crouan & H. Crouan) Seaver; *Humarina coccinea* (P. Crouan & H. Crouan) Seaver var. *coccinea*; *Humarina coccinea* var. *maritima* (Grélet) Cash; *Neottiella corallina* (Cooke) Masee; *Octospora coccinea* (P. Crouan & H. Crouan) Brumm. var. *coccinea*; *Octospora coccinea* var. *maritima* (Grélet) Parrett. & Gaggian.; *Octospora coccinea* var. *tetraspora* Benkert; *Peziza corallina* Cooke; *Peziza muralis* Quélet.

**Macroscopic and microscopic features:** Apothecia 1-2 mm in diameter, cup to flat disk shaped, margin sometimes pubescent, hymenium orange. Asci 120-180 × 16-22 µm, cylindrical to clavate, eight spored, spores biseriata. Paraphyses cylindrical, very slim, enlarged

towards the apex up to 3-7 µm, often slightly curved. Spores 25-27 × 7.5-9.5 µm, narrowly ellipsoid to narrowly fusiform, smooth, hyaline, with two big drops in the middle and often small drops at the poles. *Octospora coccinea* grows mainly among *Mniobryum* sp. but also with *Bryum argenteum* Hedw., *Bryum klinggraeffii* Schimp., *Ceratodon purpureus* (Hedw.) Brid., *Pottia* sp. (Dennis and Itzerott, 1973; Eckstein and Eckstein, 2009), *Encalypta vulgaris* Hedw. (Benkert, 2007), *Barbula unguiculata* Hedw. and *Oxyrrhynchium praelongum* (Hedw.) Warnst. (Caillet and Moyné, 1989).

**Specimen examined:** Gaziantep, Şehitkamil, Cerityenyapan village, among *Bryum* sp., 37°10'N-37°08'E, 1070 m, 07.03.2015, K.11398; K.11402; Yavuzeli, Çimenli village, 37°16'N-37°34'E, 710 m, 29.03.2015, K.11548; Nurdağı, Kömürler village, roadside, 37°09'N-36°48'E, 535 m, 03.04.2015, K.11583; Atmalı village, 37°07'N-36°53'E, 700 m, 04.04.2015, K.11618.



**Figure 7.** *Octospora coccinea*: a- ascocarp, b- asci and paraphyses, c- ascospores.



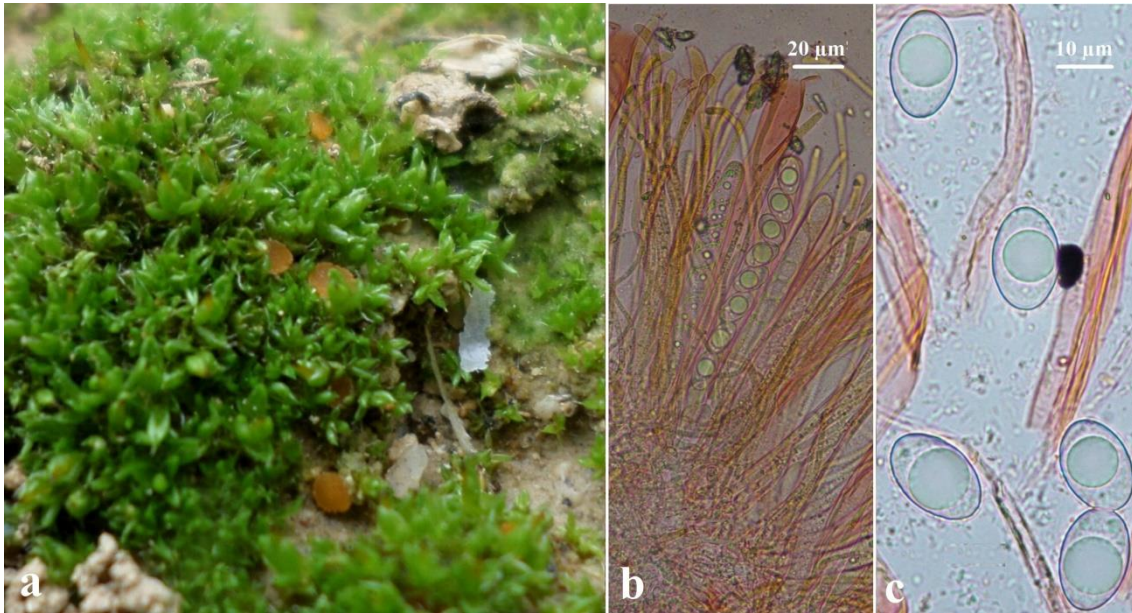
3.8. *Octospora excipulata* (Clem.) Benkert, Mycologia Montenegrina 10: 10 (2008) (Figure 8)

**Syn.** *Leucopezis excipulata* Clem., *Octospora roxheimii* Dennis & Itzerott, *Octospora roxheimii* var. *aestivalis* Caillet & Moyne, *Octospora roxheimii* Dennis & Itzerott, var. *roxheimii*.

**Macroscopic and microscopic features:** Apothecia 0.5-5 mm in diameter, pale orange to orange, lighter at the margin. Asci 150-220 × 17-22 μm, cylindrical to clavate, eight spored, spores uniseriate. Paraphyses cylindrical, septate, enlarging towards the apex up to 5-7 μm. Spores

17-27 × 12-17 μm, ellipsoid, smooth, hyaline, with a central large drop. *Octospora excipulata* grows in association with the moss *Funaria hygrometrica* Hedw. (Benkert, 2007; Eckstein and Eckstein, 2009).

**Specimen examined:** Nurdağı, Atmalı village, roadside, among *Bryum dichotomum* Hedw., 37°08'N-36°52'E, 620 m, 04.04.2015, K.11619; Ataköy, roadside, among moss, 37°08'N-36°54'E, 985 m, 22.03.2015, K.11486; Şehitkamil, Öğümsöğüt village, roadside, 37°07'N-37°19'E, 1110 m, 01.03.2015, K.11371; Gaziantep, Şahinbey, Gaziantep Zoo, among moss, 37°02'N-37°17'E, 970 m, 15.11.2015, K.12788.



**Figure 8.** *Octospora excipulata*: a- ascocarps, b- asci and paraphyses, c- ascospores.

3.9. *Octospora gemmicola* Benkert, Öst. Z. Pilzk. 7: 49 (1998) (Figure 9)

**Syn.** *Octospora gemmicola* Benkert, var. *gemmicola*, *Octospora gemmicola* var. *tetraspora* Benkert.

**Macroscopic and microscopic features:** Apothecia 1-2.5 mm in diameter, cup to disc shaped with a weak membranaceous margin, hymenium plane to cupulate, orange. Asci 160-240 × 16-23 μm, cylindrical to somewhat clavate, eight spored, spores mostly biseriata. Paraphyses cylindrical, enlarged toward the apex up to 5-8 μm. Spores 18-25 × 12-15 μm, narrowly ellipsoid to subfusiform, smooth, one to two (seldomly three) large and several small oil droplets. *Octospora gemmicola* was reported to grow among *Bryum dichotomum* Hedw., *B. rubens* Mitt., *B. ruderale* Crundw. & Nyholm and *B. radiculosum* Brid. (Eckstein and Eckstein, 2009).

**Specimen examined:** Gaziantep, Şehitkamil, Dülükbaba picnic area, on *Bryum* sp, 37°07'N-37°19'E, 1110 m, 01.03.2015, K.11367.

3.10. *Octospora leucoloma* Hedw., Descr. micr.-anal. musc. frond. (Lipsiae) 2: 13 (1789) (Figure 10)

**Specimen examined:** Gaziantep, Şahinbey, Yeşilkent cemetery, among *Pterygoneurum ovatum* (Hedw.) Dixon, 37°00'N-37°25'E, 865 m, 13.11.2015, K.12771; Nurdağı,

Kömürlü village, roadside, 37°09'N-36°48'E, 535 m, 03.04.2015, K.11593; Konya, city center, bus terminal, between the floor brick, on *Bryum argenteum*, 37°56'N-32°30'E, 1030 m, 04.12.2017, K.13944.

3.11. *Octospora musci-muralis* Graddon, Trans. Br. mycol. Soc. 58(1): 147 (1972) (Figure 11)

**Syn.** *Octospora musci-muralis* Graddon var. *musci-muralis*; *Octospora musci-muralis* var. *neglecta* (Dennis & Itzerott) Benkert; *Octospora neglecta* Dennis & Itzerott.

**Macroscopic and microscopic features:** Apothecia 1-4 mm in diameter, hymenium bright orange to orange-brown, margin paler and finely toothed. Asci 160-200 × 19-24 μm, cylindrical to clavate, attenuated at the base, 8 spored, spores biseriata. Paraphyses filiform, apically curved and enlarged up to 4-5 μm. Spores 20-25 × 9-10.5 μm, elliptical to subcylindrical, hyaline, with two or one large drops. *Octospora musci-muralis* was reported to grow on the walls on the pads of *Grimmia* Hedw. sp. (Dennis and Itzerott, 1973; Eckstein and Eckstein, 2009) and *Schistidium* Brid. sp. (Benkert, 2007).

**Specimen examined:** Gaziantep, Şehitkamil, cemetery, on *Grimmia pulvinata* (Hedw.) Sm., 37°04'N-37°23'E, 845 m, 27.02.2015, K.11329; Cerityenyapan village, 37°10'N-37°08'E, 1070 m, 07.03.2015, K.11395; Oğuzeli, cemetery, 36°57'N-37°30'E, 670 m, 08.03.2015, K.11428.



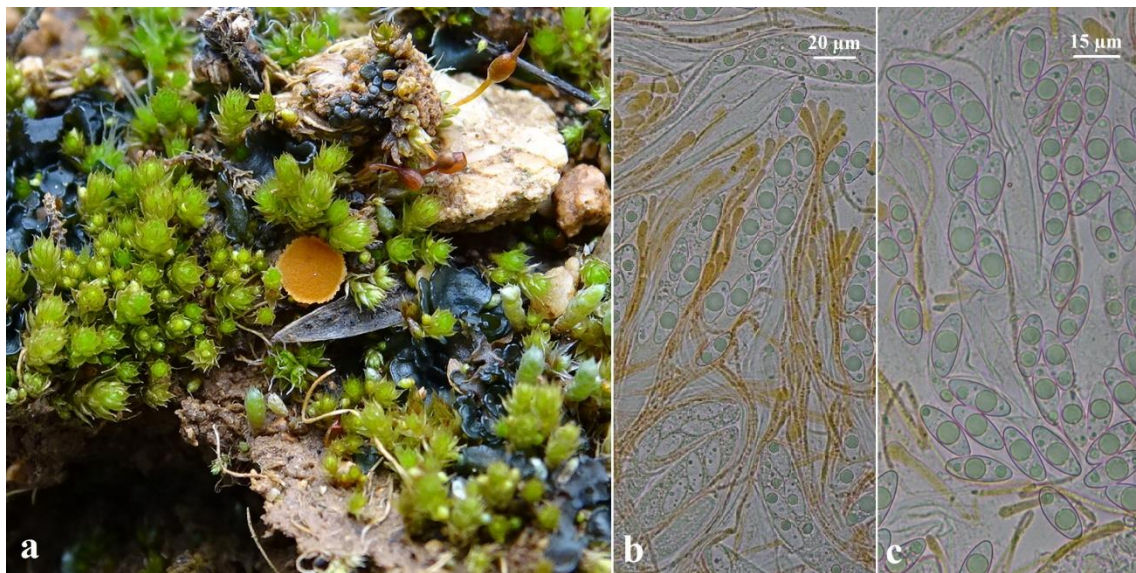


Figure 9. *Octospora gemmicola*: a- ascocarp, b- asci and paraphyses, c- ascospores.



Figure 10. *Octospora leucoloma*: a- ascocarps, b- asci and paraphyses, c- ascospores.

3.12. *Octospora orthotrichi* (Cooke & Ellis) K.B. Khare & V.P. Tewari, Can. J. Bot. 56(17): 2118 (1978) (Figure 12)

**Syn.** *Humaria orthotrichi* (Cooke & Ellis) Sacc., *Humarina orthotrichi* (Cooke & Ellis) Seaver, *Peziza orthotrichi* Cooke & Ellis.

**Macroscopic and microscopic features:** Apothecia 0.5-2 mm in diameter, cup to disc shaped, with inconspicuous membranaceous margin, hymenium pale orange to orange, margin paler. Asci 140-240 × 17-24 μm, cylindrical, 8 spored, spores generally uniseriate. Paraphyses straight, septate, enlarged towards the apex. Spores 15-20 × 10-13 μm, ellipsoid to broadly ellipsoid, some with flattened one side, warts, with one or less often with two guttules. Though the exclusive association of *Octospora orthotrichi* with *Orthotrichum diaphanum* Brid. was reported (Benkert, 1998), it can also be found on the bark of trees or on stones, always between shoots of its host (Egertova et al., 2015).

**Specimen examined:** Gaziantep, Nurdağı, Olucak village, on *Orthotrichum diaphanum* Schrad. ex Brid., 37°10'N-36°40'E, 950 m, 10.04.2015, K.11678.

3.13. *Octospora polytrichi* (Schumach.) Caillet & Moyne, Bull. trimest. Soc. mycol. Fr. 96(2): 192 (1980) (Figure 13)

**Syn.** *Barlaea polytrichi* (Schumach.) Sacc.; *Lamprospora polytrichi* (Schumach.) Le Gal; *Neottiella polytrichi* (Schumach.) Masee; *Peziza polytrichi* Schumach.; *Peziza turfosa* Pers.; *Sarcoscypha polytrichi* (Schumach.) Höhn.

**Macroscopic and microscopic features:** Apothecia 1-3 mm in diameter, saucer to disc-shaped, resting stalkless on the ground. Hymenium orange to orange reddish. Outer surface lighter, margin smooth. Asci 230-250 × 19-21 μm, cylindrical, tapering towards the base. Paraphyses cylindrical, forked at the base, septate. Spores 12-14 μm in diameter, round, hyaline and reticulately ornamented. *Octospora polytrichi* was reported to grow in association with *Polytrichum* Hedw. sp. (Wang and Kimbrough, 1992).





Figure 11. *Octospora musci-muralis*: a- ascocarps, b- asci and paraphyses, c- ascospores.

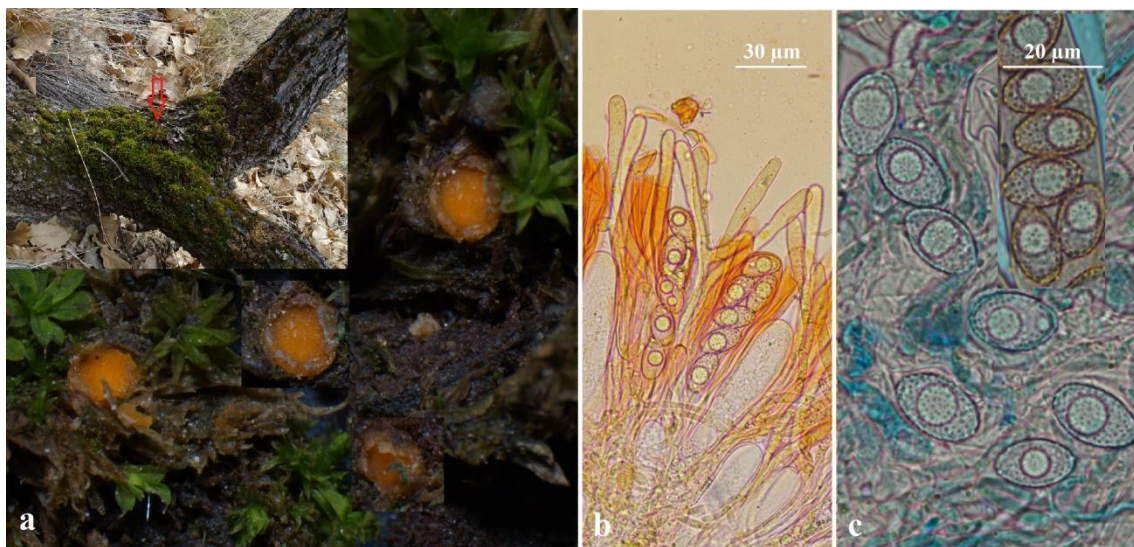


Figure 12. *Octospora orthotrichi*: a- ascocarps, b- asci and paraphyses, c- ascospores.



Figure 13. *Octospora polytrichi*: a- ascocarps, b- asci and paraphyses, c- ascospores.



**Specimen examined:** Gaziantep, Nurdağı, Kömürler village, roadside, among *Funaria hygrometrica* Hedw., 37°09'N-36°48'E, 535 m, K.11581.

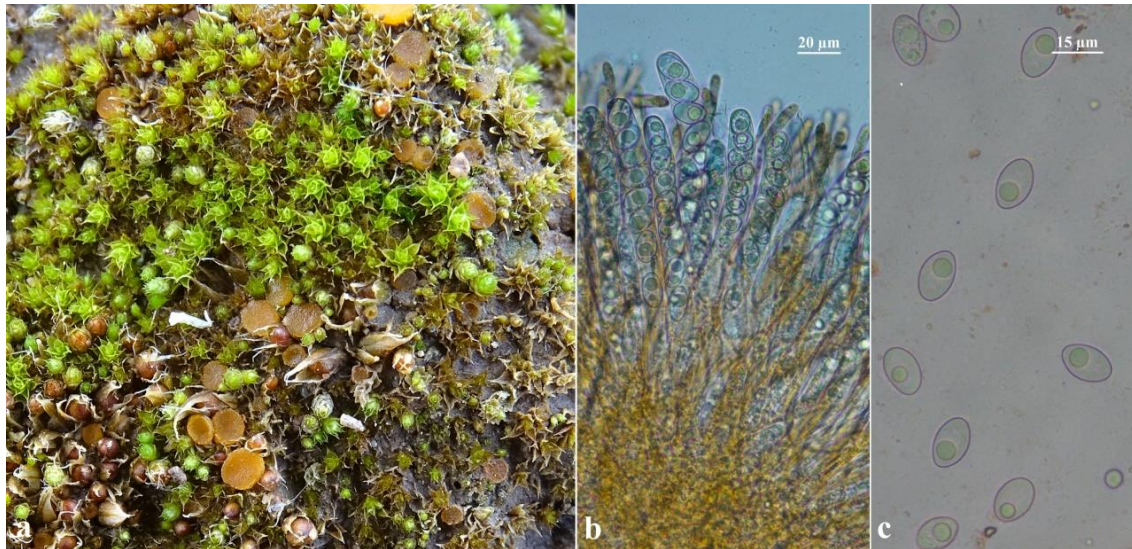
3.14. *Octospora rustica* (Velen.) J. Moravec, Česká Mykol. 23(4): 226 (1969) (Figure 14)

**Syn.** *Humaria rustica* Velen.

**Macroscopic and microscopic features:** Apothecia 1-4 mm in diameter, at first cup shaped, soon becomes flat and disc shaped, hymenium orange, pale orange without a

membranaceous margin. Asci 140-190 × 14-19 μm, cylindrical, eight spored, spores uniseriate. Paraphyses cylindrical and enlarged up to 4-7 μm towards the apex. Spores 15-18 × 10-12 μm, ellipsoid, smooth, hyaline with a large drop. *Octospora rustica* grows on sandy soil on burnt ground among *Ceratodon purpureus* (Hedw.) Brid. (Dennis and Itzerott, 1973; Caillet and Moyne, 1989).

**Specimen examined:** Gaziantep, Nurdağı, Atmalı village, among *Tortula acaulon* (With.) R.H. Zander, 37°08'N-36°52'E, 620 m, 12.04.2015, K.11728.



**Figure 14.** *Octospora rustica*: a- ascocarps, b- asci and paraphyses, c- ascospores.

#### 4. Discussion

The habit is very similar in most bryophilous *Pezizales* with extremely small and more or less orange colored ascomata hidden between host plants or organs. That's why they are usually an easily overlooked group of fungi. Even for a keen and experienced observer it is a time-consuming and troublesome task to detect them in field (Döbbeler, 1997). Due to the close similarities between macroscopic features, microscopic characteristics, especially the spores as being globose, subglobose, ellipsoid, fusiform, smooth or ornamented, are generally used as important diagnostic characters for the identification of them.

Though *Lamprospora* and *Octospora* have generally been differentiated from each other by globose and ellipsoid spores (Seaver, 1914; Yao and Spooner, 1996), here the systematics of Kirk et al. (2008) and the Index fungorum ([www.indexfungorum.org](http://www.indexfungorum.org); accessed 2 November 2017) were followed.

As a result of this study, two bryophilous ascomycete genera (*Inermisia* and *Lamprospora*) and thirteen bryophilous species within the order *Pezizales* (*Inermisia* 1, *Lamprospora* 3 and *Octospora* 9) were added as new records for the macromycota of Turkey, increasing the number of bryophilous ascomycete species of Turkey from 6 to 19. Among the determined species, *Inermisia gyalectoides* resembles *Sepultaria semi-immersa* (P. Karst.) Masee, in terms of habitat and morphology. But it differs with colorless and thin-walled anchoring hyphae, and less fusoid and shorter ascospores. It also recalls *Inermisia pilifera* (Cooke) Dennis & Itzerott, from which

it differs with larger and broader ascospores (Dennis and Itzerott, 1973).

Due to the spore similarity, *Lamprospora carbonicola* has generally been misinterpreted and frequently confused with *L. dictydiola*. However, the habitat and the host of latter species makes it easy to distinguish each other (Benkert, 1987). This species also has morphological similarities with *Pulvinula mussooriensis* (K.S. Thind, E.K. Cash & Pr. Singh) L.R. Batra. But *P. mussooriensis* differs with yellow apothecia and smaller spores (Pradhan et al., 2013; Eckstein and Eckstein, 2013).

Seaver (1914) has noted the similarity of *Octospora areolata* to the *Moravecchia calospora* (Quél.) Benkert, Caillet & Moyne, but round and non-elliptic spores of *O. areolata* distinguishes it from the latter species.

*Octospora musci-muralis* may grow in association with cushions of *Grimmia* sp., where *O. grimmia* Dennis & Itzerott generally exists. However *O. music-muralis* is easily recognizable by its elliptic cylindrical, smooth and biguttulate ascospores (Dennis and Itzerott, 1973).

*Octospora orthotrichi* has a special habitat, *Orthotrichum* sp., but *O. affinis* Benkert & L.G. Krieglst may also parasitize the mosses within the same genus. However, smaller, ellipsoid to subglobose spores and exclusive parasiticity of *O. affinis* on *Orthotrichum affine* Schrad. ex Brid. differs it from *O. orthotrichi* (Egertova et al., 2015).

Morphological and ecological characteristics of the determined species generally agree with those given in literature. But some ecological differences were also determined. For example, *O. areolata* were reported to



grow on some mosses belonging to the genera *Bryum* and *Pohlia*, but our sample was determined on *Syntrichia ruralis*. Here we determined the substrate of *Octospora exipulata* as *Bryum dichotomum*, while it was reported on *Funaria hygrometrica*. Likewise, *Ptychostomum donianum*, *Pterygoneurum ovatum* and *Tortula acaulon*

were also determined as new hosts for *O. axillaris* and *O. rustica* respectively.

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