

The genus *Peziza* Dill. ex Fr. (Pezizales, Ascomycota) in Israel

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Summary: Species diversity for *Peziza* in Israel is presented. The 25 *Peziza* species recorded from Israel include *P. alaskana*, *P. ammophila*, *P. badia*, *P. badiofusca*, *P. brunneoatra*, *P. cerea*, *P. cervina*, *P. echinospora*, *P. fimeti*, *P. fuliginea*, *P. howsei*, *P. lobulata*, *P. michelii*, *P. micropus*, *P. moseri*, *P. nivalis*, *P. proteana* f. *sparassoides*, *P. repanda*, *P. saniosa*, *P. sepiatra*, *P. succosa*, *P. succosella*, *P. tenacella*, *P. varia* and *P. vesiculosa*. Two species — *P. alaskana* and *P. lobulata* — are reported for the first time in Israel. Israeli locations and collection dates, habitat data, general distribution, and taxonomic remarks are provided for all species. Detailed macro- and micromorphological descriptions and illustrations are given for the two species newly recorded from Israel.

Keywords: Ascomycota, species diversity, Pezizales, *Pezizaceae*, taxonomy.

Introduction

The genus *Peziza* Dill. ex Fr. is the largest genus within Pezizales, with approximately 100 currently accepted species (HOHMEYER, 1986; KORF, 1972). It is a one of the interesting and complicated systematic complex and heterogeneous assemblage that constitutes the core of the family *Pezizaceae*. European countries (LE GAL, 1941; MOSER, 1963; KORF, 1954, 1972; ROMAGNESI, 1978; DONADINI, 1977, 1979; HOHMEYER, 1986; HÄFFNER, 1995; DISSING, 2000) and countries of North America (MORGAN, 1902; SEAVER, 1909, 1915; HESLER, 1937; LARSEN & DENISON, 1978), and South America (GAMUNDÍ *et al.*, 2004, 2010) have best studied this group, whereas Africa, Asia, and Australia have given less attention to these fungi. One example of insufficient species diversity studies of *Peziza* is in Israel. Unfortunately, as a whole, has been hardly studied in Israel: only a few surveys concerning these species in this subject have been published. The most notable ones include the elaborations by BINYAMINI (1973, 1984, 1986, 1993, 1994), AVIZOHAR-HERSHENZON & NEMLICH (1974), BARSEGHYAN & WASSER (2007, 2008). However, critical species diversity study or a taxonomic analysis of the *Peziza* is not carried out yet in Israel.

The genus *Peziza* includes taxa that produce epigeous, sessile or stipitate, cup-shaped, cupulate, turbinate, pulvinate or

sparassoid apothecia. The apothecia range in size from a few millimeters to more than 10 centimeters in diameter, and are often fleshy, soft and brittle. Most taxa are separated from each other mainly on the basis of their microstructural and biochemical characters such as spore shape, color, ornamentation, and guttulation; amyloid reaction of the ascus; pigmentation of the paraphyses and excipulum structure. Ecologically, the genus covers a broad range of niches, fruiting on all types of soil, sand, clay, limestone, burnt ground, dung and wood. According to PETERSEN (1967, 1985), the most *Peziza* species prefer alkali soil and in some cases a low content of organic matter. The majority of species are considered to be saprotrophs and only a few species are claimed to be ectomycorrhizal (MAIA *et al.*, 1996).

As a result of searching the literature, we found that 23 species of the genus *Peziza* were known in Israel. During our investigation, two new species from this genus were added to Israel's mycobiota. In conclusion, at present the genus *Peziza* in Israel is represented by 25 species.

Materials and methods

Our investigation is based on the growing seasons of 1996-1997, 2001-2003, 2007 and on published literature devoted to operculate discomycetes from Israel. Collecting

techniques were the same ones used for fleshy fungi. All specimens were dried using standard mushroom driers. Collected specimens are preserved in the Herbarium of the Institute of Evolution, University of Haifa (HAI, Israel). The microscopic characteristics were observed with a Carl Zeiss-amplival microscope. Microscopic photos were taken with a "Canon Power Shot G10" digital camera. Fungal material was mounted on a microscope slide and examined in water using a light/dark field microscope, with or without phase contrast, at magnification up to 1000 \times . Micromorphological characteristics of our specimens were observed using Melzer's reagent and Lactophenol Blue Solution (Fluka). For statistical calculations, 30–40 ascospores, asci, excipular hyphae, and paraphyses were measured for every preparation.

Habitat and general distribution of *Peziza* species are given from material gathered from various publications and books and from original research. All synonyms were adopted from Index Fungorum online database (<http://www.indexfungorum.org>) and were revised by authors and the most significant were chosen. Distribution of species is given, using the natural regions of Israel (fig. 3), according to FEINBRUN-DOTHAN & DANIN (1998).

Results and discussion

Synonymy, locations, dates of collection, general distribution, distribution in Israel, descriptions, illustrations and taxonomic remarks are given to 25 *Peziza* species for Israeli mycobiota. Detailed macro- and micromorphological descriptions and illustrations are given for the two species (*P. alaskana* and *P. lobulata*) newly recorded from Israel.

Family **Pezizaceae** Dumort., *An. Fam. Pl.*: 72 (1829).

Genus **Peziza** Dill. ex Fr., *Syst. Mycol.*, 2 (1): 40 (1822).

= *Scodellina* Gray, *Nat. Arr. Brit. Pl.*, 1: 668 (1821).

= *Aleuria* (Fr.) Gillet, *Champ. Fr., Discom.*: 30 (1879).

= *Phaeopezia* (Vido) Sacc., *Bot. Zbl.*, 18: 218 (1884).

= *Galactinia* (Cooke) Boud., *Bull. Soc. mycol. Fr.*, 1: 101 (1885).

= *Lepidotia* Boud., *Bull. Soc. mycol. Fr.*, 1: 101 (1885).

= *Geoscypha* (Cooke) Lambotte, *Mém. Soc. Roy. Sci. Liège, série 2*, 14: 320 (1888).

= *Daleomyces* Setch., *Mycologia*, 16 (5): 240 (1924).

= *Durandiomyces* Seaver, *North Am. Cup-fungi (Operculates)*: 242 (1928).

Type species: *Peziza vesiculosa* Bull., *Herb. Fr.*, 10: tab. 457, fig.1 (1790).

Anamorphs: *Chromelosporium* (*Ostracoderma*) and *Oedocephalum* (HANLIN, 1997).

Note. The genus *Peziza* was introduced in 1719 by Dillenius (RIFAI, 1968). Since then *Peziza* has undergone numerous amendments and interpretations. Documentation of those revisions can be found in RIFAI (1968). The most significant of these debates was over the decision of BOUDIER (1885) to place amyloid species with affinities to *Peziza* in two genera: *Aleuria* (Fr.) Gillet for species that possessed eguttulate spores and *Galactinia* Cooke for ellipsoid-spored species

with guttules (cit. in NORMAN & EGGER, 1999). This proposal was followed by LE GAL (1941) and others, but most modern taxonomists merged these genera into a broadly defined *Peziza* (ECKBLAD, 1968; RIFAI, 1968; DENNIS, 1981; DISSING & PFISTER, 1981; DISSING, 2000). Within this genus, therefore, in many cases, it is not possible to find clear diagnostic characteristics for defining the taxa. Many *Peziza* species have a rich synonymy, i.e. some species have at times been placed in different genera by different authors, and species names had been changed as well. Recent molecular studies (NORMAN & EGGER, 1996, 1999; HANSEN *et al.*, 2001, 2002, 2005) suggest that the genus *Peziza* is paraphyletic. New interpretations based on DNA evidence are leading to assignment of species to different genera based on generic relationships rather than on structure. Therefore, the names accepted in this paper, have been used currently by many mycologists, but are subject to change by new interpretations.

Peziza alaskana E.K. Cash, *J. Wash. Acad. Sci.*, 44 (2): 44 (1954) — Fig. 1.

Icon. SCHUMACHER & JENSSEN (1992: 25); CHEYPE & VAN VOOREN (2008: 42).

Ascocarps sessile, cupulate to discoid about 0.2–2.3 cm in diameter, with a prominent and commonly incurved margin.

Flesh granular, with violaceous tints. **Hymenium** smooth, deep purplish black, outside concolor or more dark violaceous, granularly pubescent. **Asci** cylindrical, sometimes curved, 258–277 (330) \times 11.5–17.3 μ m (270–320 \times 14.0–17.0 μ m, fide SCHUMACHER & JENSSEN, 1992), 8-spored, hyaline, reacting positively with Melzer's reagent, turned blue at the apex. **Ascospores** 15.84–18.81 \times 6.93–9.9 (12.0) μ m (19.0–22.2 \times 8.5–10.2 μ m, fide SCHUMACHER & JENSSEN, 1992), Q=2.28–1.9, ellipsoid, hyaline, with two, sometimes one, oil drops; ornamentation irregular, consisting of short ridges and oblong warts. **Paraphyses** of 4.6–10 μ m, cylindrical, slender, clavate in the apex, widening in the base, containing purplish black pigments.

Material examined. Israel, CM: Mt. Carmel, alt. 546 m, near Haifa University, on the limestone, calcareous soil among mosses, on river banks in *Quercus* sp. and *Pinus* sp. mixed forest, 17 February 2007, 25 February 2007, *leg.* & *det.* G. Barseghyan (HAI-D-073; HAI-D-092). Fig. 3.

Habitat and general distribution. Humus saprophyte. *P. alaskana* is a typical representative of arctic-alpine sedimentation flats on calcareous soils, on river banks, estuaries and along inland lakes. ASIA: Israel. EUROPE: Austria, Denmark, France, Italy, Norway, Sweden. NORTH AMERICA: Canada, USA.

Note. *Peziza alaskana* was reported for Israeli and Asian mycobiota for the first time. It is rare species in Israel. The dark purplish black, shallow-cupulate apothecia, and the micro-anatomical features of agglutinated paraphyses and ellipsoid, slightly pointed ascospores with a sculpturing of uneven-sized warts and short, partly anastomosing ridges, characterize *P. alaskana*. The species is often confused with *P. limnaea* Maas Geest., which may occupy similar habitats

along lakes and rivers in the lowlands (SCHUMACHER & JENSEN, 1992).

According to HANSEN *et al.* (2001) work based on phylogenetic study, *P. alaskana* belong to the complex of *P. badia* Pers. (cit. in CHEYPE & VAN VOOREN, 2008).

Peziza ammophila Durieu & Mont., in Durieu, *Expl. Sci. Alg., Bot.*, 1: tab. 28 (1847).

≡ *Geopyxis ammophila* (Durieu & Mont.) Sacc., *Syll. Fung.*, 8: 70 (1889) ; *Sarcosphaera ammophila* (Durieu & Mont.) Moesz, *Bot. Közl.*, 11 (5-6): 196 (1912).

Icon. DENNIS (1981: pl. V, A); BINYAMINI (1986: 443).

Habitat and distribution in Israel. NN: Saad on sandy soil, 3 February 1985, *leg.* Y. Anikster (BINYAMINI, 1986). Fig. 3.

Habitat and general distribution. Humus saprophyte. On soil or sandy dunes. AFRICA: Morocco. ASIA: China, Israel. Australasia: New Zealand. EUROPE: Bulgaria, Denmark, France, Germany, Greece, Hungary, Latvia, Poland, Spain, Sweden, Switzerland, United Kingdom.

Note. *Peziza ammophila* is very rare species for Israeli and Asian mycobiota. It was found by Anikster (BINYAMINI, 1986) only once in warm and sandy dunes. This fungus is definitely difficult to identify, but it grows on sand dunes and beaches, making it easy to separate from other similar brown colored species. According to DENNIS (1978), this species was found on coastal sands.

Peziza badia Pers., *Observ. Mycol.*, 2: 78 (1800).

≡ *Plicaria badia* (Pers.) Fuckel, *Jb. Nassau. Ver. Naturk.*, 23-24: 327 (1870) ; *Galactinia badia* (Pers.) Arnould, *Bull. Soc. mycol. Fr.*, 9: 111 (1893).

Icon. COOKE (1878: pl. 57, fig. 226); GILLET (1879: pl. 42); SEAVER (1915: pl. CLV); SMITSKAJA (1980: 100); DENNIS (1981: pl. VI, D); PHILLIPS (1981: 270); BINYAMINI (1984: fig. 6); BREITENBACH & KRÄNZLIN (1984: 61); HANLIN (1997: 53).

Habitat and distribution in Israel. UG: January-February, in *Quercus* sp. forests, widespread (BINYAMINI, 1984). Fig. 3.

Material examined. Israel, CM: Harshav Harbaim, on the ground under *Quercus* sp., 16 February 2001, *leg.* S.P. Wasser, det. G. Barsaghyan (HAI-D-087); National Park, Nahal Neshet, on the ground under *Quercus* sp., 13 March 2003, *leg.* & det. S.P. Wasser (HAI-D-088). UG: Nahal Kziv, on the ground, 5 March 2001, *leg.* & det. S.P. Wasser (HAI-D-083); Masada forest, on ground in *Quercus* sp. groves, 24 January 2002, *leg.* Y. Ur, det. S.P. Wasser (HAI-D-080).

Habitat and general distribution. Humus saprophyte. On sandy-loamy soils in woods. ASIA: China, Israel, Japan, Kazakhstan, Korea, South Caucasus. AUSTRALASIA: New Zealand. EUROPE: Austria, Bulgaria, Denmark, Finland, France, Germany, Italy, Norway, Poland, Portugal, Russia, Slovenia, Spain, Sweden, Switzerland, Ukraine, United Kingdom. NORTH AMERICA: Canada, USA. SOUTH AMERICA: Argentina.

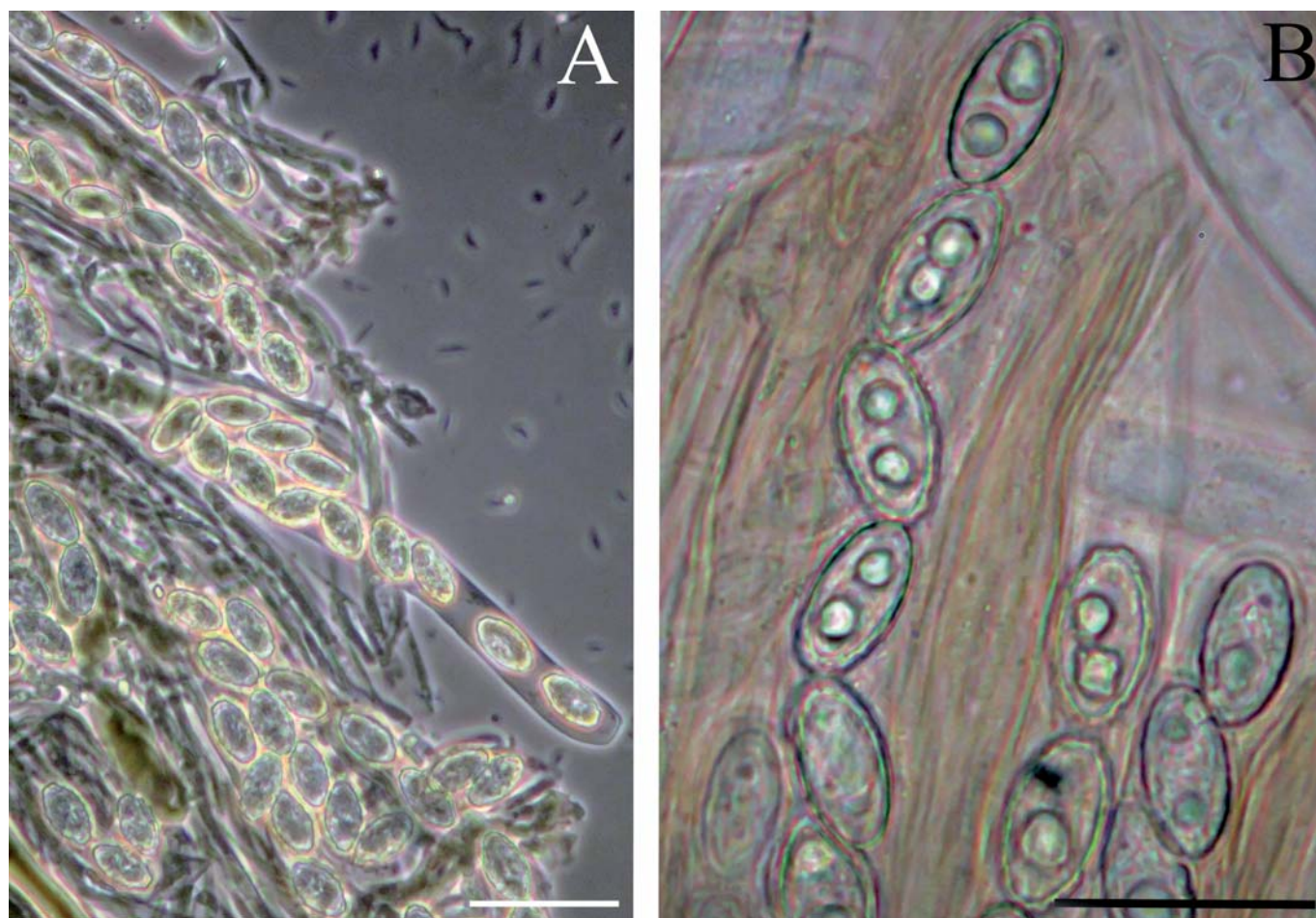


Fig. 1. — *Peziza alaskana*. Collection HAI-D-073.

A - hymenium (asci, ornamented ascospores and paraphyses); B - biguttulate ascospores. Scale bars: 30 μ m.

Note. There are poor notes about *Peziza badia* by BINYAMINI (1984); he did not mention the place of the sample collection, where herbarium kept, and other important information. *P. badia* differs clearly from the *P. varia* and *P. vesiculosa* by its dark olive-brown color.

Peziza badiofusca (Boud.) Dennis, *Brit. Cup Fungi*: 16 (1960).

≡ *Galactinia badiofusca* Boud., *Hist. Class. Discom. Eur.*: 48 (1907).

Icon. DENNIS (1981: pl. IV, J).

Habitat and distribution in Israel. CM: Bet Oren, on ground in an open place, 5 March 1975, 16 January 1984 (BINYAMINI, 1986). Fig. 3.

Habitat and general distribution. Humus saprophyte. On the ground in forests. AFRICA: Algeria, Morocco. ASIA: Israel, Kazakhstan. AUSTRALASIA: Australia. EUROPE: Austria, Bulgaria, Czech Republic, Denmark, Germany, Poland, Spain, Sweden, United Kingdom. NORTH AMERICA: Canada, USA.

Note. *Peziza badiofusca* is very rare species for Israeli and Asian microbiota. It was reported in Israel only once by BINYAMINI (1986). According phylogenetic research by HANSEN *et al.* (2005), this species takes place in a group with *P. michelii* that yield a yellow juice.

Peziza brunneoatra Desm., *Descr. Esp. Nouv.*: 9 (1836).

≡ *Galactinia brunneoatra* (Desm.) Boud., *Hist. Class. Discom. Eur.*: 49 (1907).

Icon. AVIZOHAR-HERSHENZON & NEMLICH (1974: 159); DENNIS (1981: pl. IV, G).

Habitat and distribution in Israel. CM: solitary, among mosses, under *Cistus villosus* in vicinity of *Pinus halepensis*, 8-28 February 1971 (AVIZOHAR-HERSHENZON & NEMLICH, 1974). Fig. 3.

Habitat and general distribution. Humus saprophyte. On ground in woods. ASIA: China, Israel. EUROPE: Bulgaria, Denmark, France, Germany, Norway, Poland, Spain, Switzerland, United Kingdom. NORTH AMERICA: Canada, USA.

Note. According to AVIZOHAR-HERSHENZON & NEMLICH (1974), the outer surface of Israeli specimens is paler than the hymenium, and the spores only biguttulate and not many, as recorded by LE GAL (1941) and DENNIS (1978). SEAVER (1961) mentions two or more conspicuous oil drops. This species was included in the "Red List of Fungi in Bulgaria" (GYOSHEVA *et al.*, 2006).

Peziza cerea Sowerby, *Col. Fig. Engl. Fung. Mushr.*, 1: 6 (1796).

≡ *Plicaria cerea* (Sowerby) Fuckel, *Jb. Nassau. Ver. Naturk.*, 23-24: 327 (1870); *Pustularia vesiculosa* var. *cerea* (Sowerby) Rehm, *Rab. Krypt.-Fl.*, 3: 1018 (1896); *Galactinia vesiculosa* f. *cerea* (Sowerby) Svrček, *Česká Mykol.*, 14(4): 219 (1960); *Galactinia cerea* (Sowerby) Le Gal, *Bull. Soc. mycol. Fr.*, 78: 208 (1962).

= *Peziza muralis* Sowerby, *Col. Fig. Engl. Fung. Mushr.*, 3: pl. 251 (1800); *Geopyxis muralis* (Sowerby) Sacc., *Syll. Fung.*, 8: 72 (1889).

= *Galactinia tectoria* (Cooke) Le Gal, *Bull. Soc. mycol. Fr.*, 78: 210 (1962).

Icon. BOUDIER (1905-1910: pl. 259); SMITSKAJA (1980: 107); DENNIS (1981: pl. V, C); DONADINI (1981: 16; 1984: 164, fig. 1); PHILLIPS (1981: 269).

Habitat and distribution in Israel. CM: Bet Oren, on woody debris, under *Quercus* sp. trees, 6 January 1992 (BINYAMINI, 1993). Fig. 3.

Habitat and general distribution. Humus saprophyte. On soil, decayed wood. AFRICA: Morocco. ASIA: China, Israel. AUSTRALASIA: Australia, New Zealand. EUROPE: Austria, Bulgaria, Denmark, Finland, France, Germany, the Netherlands, Norway, Poland, Portugal, Slovenia, Spain, Sweden, Switzerland, United Kingdom. NORTH AMERICA: USA (South Georgia and the South Sandwich Islands).

Note. According to DONADINI (1979) and BREITENBACH & KRÄNZLIN (1984), *Peziza cerea* shows slightly punctate ascospores. The details of prosenchymatous tissue of Israeli specimens conform well to the description of RIFAI (1968) (cit. in BINYAMINI, 1993). Due to morphological similarity of ascocarps and ascospores of *P. cerea* may be confused with of *P. varia*, which also occurs in Israel. However, *P. varia* has a moniliform structure of paraphyses, which is absent in *P. cerea*.

Peziza cervina (Fuckel) Sacc., *Syll. Fung.*, 8: 84 (1889).

≡ *Plicaria cervina* Fuckel, *Jb. Nassau. Ver. Naturk.*, 23-24: 327 (1870).

Icon. AVIZOHAR-HERSHENZON & NEMLICH (1974: 159).

Habitat and distribution in Israel. JM: caespitose or gregarious, under *Quercus calliprinos*, in vicinity of *Pinus halepensis*, 8 February 1969, 27 February 1972 (AVIZOHAR-HERSHENZON & NEMLICH, 1974). Fig. 3.

Habitat and general distribution. Humus saprotrophs. On the ground in forests. ASIA: China, Israel. EUROPE: Austria, France, Germany.

Note. *Peziza cervina* is rare species for Israeli and Asian microbiota. According to AVIZOHAR-HERSHENZON & NEMLICH (1974), ascospores of Israeli specimens are somewhat shorter than those noted by SACCARDO (1889) and MOSER (1963).

Peziza echinospora P. Karst., *Not Sallsk. Fauna et Flora Fennica*, 10: 115 (1869).

≡ *Galactinia echinospora* (P. Karst.) Svrček & Kubička, *Česká Mykol.*, 15: 74 (1961).

= *Peziza umbrina* Boud., in Cooke, *Mycogr., Discom.*, 1: 378 (1878); *Aleuria umbrina* (Boud.) Gillet, *Champ. Fr., Discom.*: 42 (1881).

= *Peziza anthracophila* Dennis, *Brit. Cup Fungi*: 13 (1960). Misapplied: *Galactinia pustulata sensu auct. brit.*, fide CANNON *et al.* (1985).

Icon. BOUDIER (1905-1910: pl. 279); LE GAL (1941: 64, fig. 3); DENNIS (1981: pl. V, F); PHILLIPS (1981: 270); DONADINI (1981: 30, pl. 2), (1984: 164, fig. 12); BINYAMINI (1984: fig. 9, under *P. pustulata* (Hedw.) Pers.); BREITENBACH & KRÄNZLIN (1984: 71); LUCCHINI (1997: 316, fig. 75); ELLIS & ELLIS (1998: pl. 16, fig. 147).

Habitat and distribution in Israel. CM: rare, Bet Oren, on burnt soil in *Quercus* forests, 14 January 1985 (BINYAMINI, 1986). Fig. 3.

Habitat and general distribution. Not edible. Carbotrophs. On burnt ground. ASIA: Israel, Korea. EUROPE: Austria, Bulgaria, Denmark, Finland, France, Germany, Iceland, The Netherlands, Norway, Poland, Slovenia, Spain, Sweden, Switzerland, United Kingdom. NORTH AMERICA: USA. SOUTH AMERICA: Argentina, Chile.

Note. *Peziza echinospora* is one of the complicated species within genus *Peziza*. During the time, it was suggested that this fungus was the old *Octospora pustulata*, but modern taxonomists are agreed in regarding Hedwig's species as the synonyms of *Tarzettia catinus*. Boudier called the present species *Aleuria umbrina*, but it is not an *Aleuria*, in the modern sense, and this epithet cannot be transferred to *Peziza* as there is already a *P. umbrina* (DENNIS, 1981).

P. echinospora is a very rare species for Israeli and Asian mycobiota. According to BINYAMINI (1986), the dark brown disc and the whitish outer surface of Israeli specimens conform well to the description of DENNIS (1978, 1981).

According to STALPERS (1974), the conidial state of *P. echinospora* is *Oedocephalum elegans* Preuss.

Peziza fimeti (Fuckel) Seaver, *North Am. Cup-fungi*: 232 (1928).

≡ *Humaria fimeti* Fuckel, *Jb. Nassau. Ver. Naturk.*, 25-26: 338 (1871); *Plicaria fimeti* (Fuckel) Rehm, *Rabenh. Krypt.-Fl.*, 3: 1009 (1896); *Galactinia fimeti* (Fuckel) Svrček & Kubička, *Česká Mykol.*, 15: 74 (1961).

= *Peziza bovina* W. Phillips, *Man. Brit. Discom.*: 308 (1887); *Humaria bovina* (W. Phillips) Sacc., *Syll. Fung.*, 8: 146 (1889).

Icon. BRESADOLA (1898: pl. 192); BELL (1983: fig. 34, under *Peziza bovina*); BINYAMINI (1984: fig. 7); PROKHOROV (2004: 154).

Habitat and distribution in Israel. UG: January-February, on cow manure, widespread (BINYAMINI, 1984). Fig. 3.

Material examined. Israel, SH: Shimson forest, on cow manure, 5 February 2007, *leg.* Y. Ur, det. G. Barseghyan (HAI-D-070). Fig. 3.

Habitat and general distribution. Coprophilous. On dung of herbivorous animals. ASIA: Israel, Kazakhstan. AUSTRALASIA: Australia, New Zealand. EUROPE: Austria, Bulgaria, Cyprus, Czech Republic, Denmark, Finland, France, Germany, Iceland, Italy, Norway, Poland, Spain, Sweden, Switzerland, Ukraine, United Kingdom. NORTH AMERICA: USA. SOUTH AMERICA: Argentina.

Note. *Peziza fimeti* is a very rare species in Israel and was mentioned for the first time by BINYAMINI (1984) without giving exact place of the sample collection, where herbarium kept, and other important information. DONADINI (1977) placed *P. bovina* as synonym of *P. fimeti*. According our opinion, *P. bovina* has distinctly larger ascospores (~20 µm long) than *P. fimeti*. It can be easily confused with *P. moravecii* (Svrček) Svrček, *P. merdae* Donadini, *P. fimetosa* Fr., and *P. chlorophysa* (Clem.) Sacc. & D. Sacc. Taxonomic position

of this whole group is still questionable and needs of critical revision.

Peziza fuliginea Schumach., *Enum. Pl.*, 2: 427 (1803).

≡ *Barlaea fuliginea* (Schumach.) Sacc., *Syll. Fung.*, 8: 117 (1889).

Icon. AVIZOHAR-HERSHENZON & NEMLICH (1974: 155).

Habitat and distribution in Israel. CM: solitary, among stones, near *Pistacia lentiscus*, 19 January 1972 (AVIZOHAR-HERSHENZON & NEMLICH, 1974). Fig. 3.

Habitat and general distribution. Humus saprophyte. On the ground in forests. ASIA: Georgia, Israel. EUROPE: Denmark, Germany, Russia, Sweden, United Kingdom. NORTH AMERICA: USA.

Note. MOSER (1963), RIFAI (1968) and DENNIS (1978) preserved the name *Plicaria* or *Plicariella* for the genus of *Pezizaceae* with globose ascospores. KORF (1972) disagrees with this treatment and classifies it in the genus *Peziza*.

Peziza howsei Roze & Boud., *Bull. Soc. bot. Fr.*, 26: LXXV, tab. 3, fig. 3 (1879).

≡ *Peziza emileia* Cooke, *Mycographia*: 226 (1879); *Galactinia howsei* (Roze & Boud.) Boud., *Hist. Class. Discom. Eur.*: 48 (1907); *Peziza howsei* Donadini, *Bull. Soc. Linn. Provence*, 31: 29 (1979).

Habitat and distribution in Israel. CM: January-March, in *Pinus* sp. and *Quercus* sp. mixed forest, on the ground, rare (BINYAMINI, 1984). Fig. 3.

Habitat and general distribution. Humus saprophyte. On the ground in the woods. ASIA: Israel. EUROPE: Austria, Bulgaria, Denmark, Estonia, Germany, The Netherlands, Norway, Poland, Spain, Sweden, Switzerland, United Kingdom.

Note. The first record in Israel of *Peziza howsei* was made by BINYAMINI (1984) as *P. emileia* without giving any information about the exact place of sample collections and kept materials. It is very rare species for Israeli and Asian mycobiota.

Peziza lobulata (Velen.) Svrček, *Česká Mykol.*, 30 (3-4): 130 (1976) — Fig. 2.

≡ *Plicaria lobulata* Velen., *Novit. Mycol.*: 196 (1939).

Icon. LE GAL (1941: 64, fig. 3); DENNIS (1981: 20, pl. V J); FRANCHI *et al.* (1992: 56-57).

Apothecia sessile, discoid or cup-shaped, about 0.5–3 cm broad, irregularly expanded and split at the margin when old. **Flesh** whitish-violet, fragile. **Hymenium** smooth, deep violet or brown violet. **Outside** glabrous, bluish gray. **Asci** cylindrical, 200–350 × 12–15 µm, 8-spored, reacting positively with Melzer's reagent, turned blue at the apex. **Ascospores** 13–15.5 × 7–8.5 µm, Q=1.8, uniseriate, hyaline, widely ellipsoid, smooth, eguttulate. **Paraphyses** filiform, septate, 2.5–3 µm wide, sometimes forked, most often curved, containing a violaceous brown pigment.

Material examined. Israel, SH: Yacir Shimshon, on the ground under *Pinus* sp., 26 February 2007, *leg.* & det. G. Barseghyan (HAI-D-072). Fig. 3.

Habitat and general distribution. Carbotrophs. On the burnt ground in forests. ASIA: Israel. EUROPE: Austria, Bulgaria, Czech Republic, Denmark, France, Iceland, Italy, Lithuania, Norway, Sweden, Switzerland. NORTH AMERICA: USA.

Note. *Peziza lobulata* is reported in Israel and Asia for the first time. It is very rare species for Israeli and Asian mycobiota. This species can be confused with *Peziza ampelina* Quéf. and other violaceous species growing on burnt places. The shape of paraphyses and smooth surface of ascospores nevertheless separate it clearly.

Peziza michelii (Boud.) Dennis, *Brit. Cup Fungj*: 15 (1960).
 = *Galactinia michelii* Boud., *Bull. Soc. mycol. Fr.*, 7: 215 (1891).
 = *Galactinia plebeia* Le Gal, *Rev. mycol. (Paris)*, 2: 208 (1937); *Peziza plebeia* (Le Gal) Nannf., in Lundell & Nannfeldt, *Fungj Exsiccati Suecici*, 27-28: 1373 (1946).

Icon. AVIZOHAR-HERSHENZON & NEMLICH (1974: 155, under *Peziza plebeia* (Le Gal) Nannf.); DENNIS (1981: pl. VI, F); BREITENBACH & KRÄNZLIN (1984: 73).

Habitat and distribution in Israel. CM: solitary, among mosses, in vicinity of *Pinus halepensis* and *Quercus calliprinos*, 8 January 1971, 24 February 1971, as *Peziza plebeia* (AVIZOHAR-HERSHENZON & NEMLICH, 1974). Fig. 3.

Habitat and general distribution. Humus saprophyte. On the ground in forests. AFRICA: Algeria, Morocco, Tunisia. ASIA: Israel, Korea. EUROPE: Austria, Bulgaria, Denmark, France, Germany, Iceland, Norway, Poland, Slovenia, Spain, Sweden, Switzerland, United Kingdom. NORTH AMERICA: Canada, USA.

Note. *Peziza michelii* is rare species for Israeli and Asian mycobiota. According to AVIZOHAR-HERSHENZON & NEMLICH (1974), the paraphyses of Israeli specimens are brown colored and conspicuously clavate, contrary to the data of LE GAL (1937), who describes the paraphyses as having bright green gra-

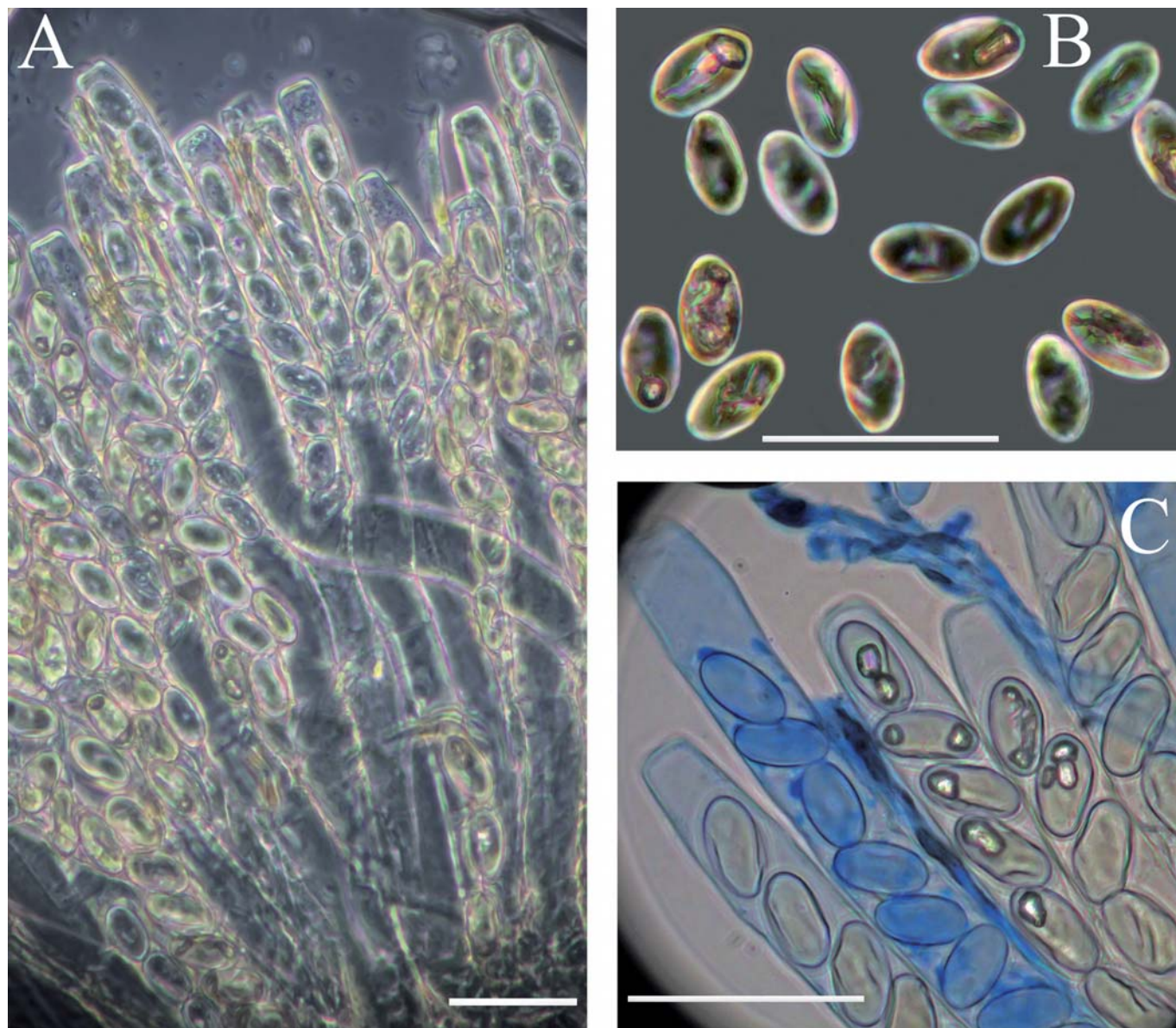


Fig. 2. — *Peziza lobulata*. Collection HAI-D-072.
 A - Hymenium (asci, ascospores and paraphyses); B - Ascospores. C - Ascus with ascospores in lactophenol blue solution.
 Scale bars: 20 μ m.

nules and thickened to 5 µm only. HANSEN *et al.* (2005) place this species in a group with *P. succosa* that yield a yellow juice (as *P. michelii* does).

Peziza micropus Pers., *Icon. Desc. Fung. Min. Cognit.*, 2: 30 (1800).

≡ *Otidea micropus* (Pers.) Sacc., *Syll. Fung.*, 8: 98 (1889); *Geopyxis micropus* (Pers.) Rehm, *Rabenh. Krypt.-Fl.*, 3: 975 (1896); *Galactinia micropus* (Pers.) Svrček, *Česká Mykol.*, 16: 111 (1962).

= *Peziza cocotina* Cooke, *Grevillea*, 5 (34): 61 (1876); *Lachnea cocotina* (Cooke) W. Phillips, *Man. Brit. Discom.*: 206 (1887); *Geopyxis cocotina* (Cooke) Masee, *Brit. Fung. Fl.*, 4: 380 (1895); *Sarcoscypha cocotina* (Cooke) Sacc., *Syll. Fung.*, 8: 158 (1889).

Icon. AVIZOHAR-HERSHENZON & NEMLICH (1974: 159); DENNIS (1981: pl. V, B); BREITENBACH & KRÄNZLIN (1984: 75).

Habitat and distribution in Israel. SP: solitary, on rotten branch, under *Cupressus sempervirens*, 20 December 1968 (AVIZOHAR-HERSHENZON & NEMLICH, 1974). Fig. 3.

Material examined: Israel, UG: Kiryat Shmona, on ground under *Eucalyptus* sp., 19 January 2002, *leg.* Y. Ur, det. S.P. Wasser (HAI-D-081). Fig. 3.

Habitat and general distribution. Wood saprophyte (deciduous trees). ASIA: Israel. EUROPE: Austria, Bulgaria, Denmark, Estonia, France, Germany, The Netherlands, Norway, Poland, Slovenia, Spain, Sweden, Switzerland, United Kingdom. NORTH AMERICA: USA.

Note. *Peziza micropus* is rare species for Israeli and Asian mycobiota. This fungus is very similar to *Peziza varia* f. *lignicola* (BRESADOLA, 1898, 1933). Morphologically, it may be also confused with *P. varia*, *P. repanda* and *P. ampliata*. Based on the ITS data, *P. micropus* is considered to be synonymous with, or part of the “*P. varia* complex” which is including *P. cerea* and *P. repanda* species (HANSEN *et al.*, 2002).

Peziza moseri Aviz.-Hersh. & Nemlich, *Isr. J. Bot.*, 23 (3): 157 (1974).

= *Aleuria lilacina* Boud., *Hist. Class. Discom. Eur.*: 45 (1907); *Humaria lilacina* (Boud.) Sacc. & Traverso, *Syll. Fung.*, 19: 880 (1910); *Peziza lilacina* (Boud.) Sacc. & Traverso, *Syll. Fung.*, 20: 315 (1911), *illeg.*, non *P. lilacina* Fr. (1822).

Icon. BOUDIER (1905-1910: pl. 277); AVIZOHAR-HERSHENZON & NEMLICH (1974: 155); BREITENBACH & KRÄNZLIN (1981: 55).

Habitat and distribution in Israel. CM: scattered or caespitose, on burnt ground, in vicinity of *Quercus calliprinos* and *Pinus halepensis*, 19 January 1972. MJ: on a trench wall, in vicinity of *Q. calliprinos*, 12 February 1972, 2 March 1968, *leg.* J. Cohen; among mosses in vicinity of *P. halepensis*, 1 January 1969; on compost, 5 March-17 March 1971; in a courtyard under *Ficus retusa*, 4 January 1969, 14 February 1970; among ornamental shrubs, 20 January 1971; on burnt ground among shrubs of *Calycotome villosa*, 20 January 1972 (AVIZOHAR-HERSHENZON & NEMLICH, 1974). Fig. 3.

Habitat and general distribution. Carbotrophs. On burnt ground. ASIA: Israel. EUROPE: Austria, Bulgaria, Germany, Italy, Norway, Switzerland, United Kingdom.

Note. *Peziza moseri* was a dubious species long time. LE GAL (1941) and Moser (1963) distinguish this species as *P. violacea*, but with lighter color of apothecia.

Peziza nivalis (R. Heim & L. Remy) M.M. Moser, *Isr. J. Bot.*, 23: 162 (1974).

≡ *Galactinia nivalis* R. Heim & L. Remy, *Bull. Soc. mycol. Fr.*, 48 (1): 63 (1932); *Aleuria nivalis* (Heim & Remy) Heim, *Rev. mycol. (Paris)*, 12: 71 (1947).

= *Peziza flos-nivium* Donadini, *Bull. Soc. Linn. Provence*, 30: 80 (1978).

Icon. Breitenbach & Kränzlin (1984: 75).

Habitat and distribution in Israel. UG: Mt. Hermon, solitary near snow-line, 10 June 1971, *leg.* A. Zehavi (AVIZOHAR-HERSHENZON & NEMLICH, 1974). Fig. 3.

Material examined. Israel, LG: Mt. Hazon, on the ground among mosses in Pinus sp. forest, 3 February 2007, *leg.* Y. Ur, det. G. Bar-seghyan (HAI-D-074). Fig. 3.

Habitat and general distribution. Humus saprophyte. On the ground in forests. ASIA: Israel. EUROPE: Bulgaria, Switzerland. Australasia: New Zealand. NORTH AMERICA: USA.

Note. *Peziza nivalis* is rare species for Israeli and Asian mycobiota. The size of ascospores in our specimens is somewhat larger than mentioned by AVIZOHAR-HERSHENZON & NEMLICH (1974).

Peziza proteana* f. *sparassoides (Boud.) Korf, *Mycologia*, 48: 714 (1956).

≡ *Aleuria proteana* var. *sparassoides* Boud., *Bull. Soc. mycol. Fr.*, 15: 50 (1899); *Galactinia proteana* var. *sparassoides* (Boud.) Sacc. & P. Syd., *Syll. Fung.*, 16: 709 (1902); *Underwoodia sparassoides* (Boud.) Bánhegyi, *Index Horti Bot. Univ. Budapest*, 3: 19 (1937).

= *Gyromitra phillipsii* Masee, *Brit. Fung. Fl.*, 4: 478 (1895); *Durandiomyces phillipsii* (Masee) Seaver, *N. Amer. Cup Fungi*: 242 (1928); *Daleomyces phillipsii* (Masee) Seaver, *N. Amer. Cup Fungi*, Suppl.: 337 (1942).

= *Underwoodia campbellii* Sacc., *Annal. Mycol.*, 7: 433 (1909); *Peziza proteana* f. *campbellii* (Sacc.) Korf, *Rep. Tori Mycol. Inst.*, 10: 392 (1973); *Daleomyces campbellii* (Sacc.) J. Moravec, *Česká Mykol.*, 36(2): 112 (1982).

= *Daleomyces gardneri* Setchell, *Mycologia*, 16: 241 (1924).

Icon. BOUDIER (1905-1910 : 2); AVIZOHAR-HERSHENZON & NEMLICH (1974 : pl. I); DENNIS (1981: pl. VI-L); PHILLIPS (1981: 270); BARSEGHYAN & WASSER (2007: 162).

Habitat and distribution in Israel. SH: solitary, in mixed forest, 19 February 1970 (AVIZOHAR-HERSHENZON & NEMLICH, 1974). CM: Bet Oren, on the ground in *Quercus* forest, 4 December 1984, *leg.* H. Lahav (BINYAMINI, 1986). Fig. 3.

Material examined. CM: near University of Haifa, on the burnt ground in woods and on charred stumps, 12 Apr. 2001, *leg.* S. Res-

hetnikov, det. G. Barseghyan (HAI-D-001) (BARSEGHYAN & WASSER, 2007). Fig. 3.

Habitat and general distribution. Humus saprotrophs and carbotrophs, very rare. On the ground in wood, especially of *Quercus*, *Fagus*, often after fires. April to May, September to October. ASIA: Israel. EUROPE: Belgium, Czech Republic, France, Germany, Norway, United Kingdom. NORTH AMERICA: USA.

Note. *Peziza proteana* f. *sparassoides* is quite a rare species for Europe. It is well known in England (DENNIS, 1981). Literature overview shows that this species appears mostly in burned places in September and October in *Fagus* forests (DENNIS, 1981). This fungus was found in places with poor vegetation, in open places in Germany (SCHIEFERDECKER, 1963). Therefore, we can definitely say that the development of this fungus does not depend on vegetation formations. It is a very rare species for Israeli and Asian mycobiota. By its form, it can be confused with *Sparassis crispa*, this opinion was traced in some literature (SACCARDO, 1902). This species differs from other species of the genus *Peziza* and it is easily recognized by its very large fruiting body and microscopic examination of the amyloid asci and warted spores. We noticed that the spores of our species are characterized by two appendages at the edge, and by one oil drop in most of all cases. This characteristic was never mentioned in any other descriptions. It is clearly distinguished from the species of Helvellaceae by the blue reaction of its asci to iodine. In all microscopic features, it is similar with a normal cup-shaped form of *Peziza proteana* (BARSEGHYAN & WASSER, 2007).

Peziza repanda Pers., *Icon. Pict. Rari. Fung.*, 4: 49 (1808).
= *Aleuria repanda* (Pers.) Gillet, *Champ. Fr., Discom.*: 43 (1879); *Discina repanda* (Pers.) Sacc., *Syll. Fung.*, 8: 100 (1889); *Plicaria repanda* (Pers.) Rehm, *Rabenh. Krypt.-Fl.*, 3: 1007 (1896); *Cellularia repanda* (Pers.) Kuntze, *Revis. Gen. Pl.*, 3 (2): 452 (1898); *Galactinia repanda* (Pers.) Le Gal, *Bull. Soc. mycol. Fr.*, 78: 208 (1962).
= *Aleuria varia* f. *terrestris* Bres., *Fungi Tridentini*, 2: 76 (1898).
= *Peziza linteicola* W. Phillips & Plowr., *Man. Brit. Discom.*: 64 (1887).

Icon. COOKE (1875-1879: 240); BRESADOLA (1898: pl. 189); LE GAL (1941: 64, fig. 3); SEAVER (1942: 230); AVIZOHAR-HERSHENZON & NEMLICH (1974: 159); SMITSKAJA (1980: 99); DENNIS (1981: pl. V); DONADINI (1981: 17, pl. 5-6, fig. 2); PHILLIPS (1981: 269); BINYAMINI (1984: fig. 10); PANTIDOU (1991: 187).

Habitat and distribution in Israel. JM: solitary, in densely crowded groups (up to ten), under *Quercus calliprinos*, 12 February 1972. SP: in a tree nursery, under *Cupressus arizonica*, 3 March 1968, 11 January 1969, 26 January-13 March 1971, 24 December 1971; caespitose, among and decaying branches of *C. macrocarpa* Hart., in an abandoned tree nursery, 9 January-6 February 1969, 15 January-18 February 1970, 8 February-28 February 1971 (AVIZOHAR-HERSHENZON & NEMLICH, 1974). Fig. 3.

Material examined. Israel, CM: Nahal Oren National Park, on the ground, 6 February 1996, leg. T. Pavlichek, det. Wasser (HAI-D-034); National Park, Nahal Neshet, on the ground in *Pinus* sp. and

Quercus sp. mixed forest, 20 March 1997, leg. and det. S.P. Wasser (HAI-D-021). UG: Mt. Hermon, on the ground under *Quercus calliprinos*, 7 March 2007, leg. V. Malisheva, det. G. Barseghyan (HAI-D-014). Fig. 3.

Habitat and general distribution. Humus and litter saprophyte. On rotten logs of deciduous trees. ASIA: China, Israel, Japan, Kazakhstan, Korea, South Caucasus. AUSTRALASIA: Australia, New Zealand. EUROPE: Austria, Bulgaria, Denmark, Finland, France, Germany, The Netherlands, Norway, Poland, Spain, Sweden, Switzerland, Russia, Ukraine, United Kingdom. NORTH AMERICA: USA.

Note. According to MOSER (1963) and DENNIS (1978), *Peziza repanda* is sessile and grows on the ground or in sawdust. *P. repanda* is similar to *P. varia* in structure of flesh and shows general similarity to *Aleuria varia* f. *terrestris* (BRESADOLA, 1933).

Peziza saniosa Schrad., *J. Bot.*, 2 (1): 64 (1799).
= *Aleuria saniosa* (Schrad.) Gillet, *Champ. Fr., Discom.*: 46 (1879); *Galactinia saniosa* (Schrad.) Sacc., *Syll. Fung.*, 8: 106 (1889); *Plicaria saniosa* (Schrad.) Rehm, *Rabenh. Krypt.-Fl.*, 3: 1004 (1896).
Icon. AVIZOHAR-HERSHENZON & NEMLICH (1974: 155); DENNIS (1981: pl. V, H); PHILLIPS (1981: 270); BREITENBACH & KRÄNZLIN (1984: 76).

Habitat and distribution in Israel. CM: scattered, among *Cistus villotus* and *C. salvifolius*, in vicinity of *Pinus halepensis*, 30 December 1969-13 March 1970; under *Cistus* sp. and *Quercus calliprinos*, 8 February 1971, 25 January-20 February 1972 (AVIZOHAR-HERSHENZON & NEMLICH, 1974). Fig. 3.

Habitat and general distribution. Humus saprophyte. On the ground of forests. ASIA: Israel, China. Australasia: New Zealand. EUROPE: Austria, Bulgaria, Denmark, Finland, France, Germany, Norway, Poland, Russia, Slovenia, Spain, Sweden, Switzerland, Ukraine, United Kingdom. NORTH AMERICA: USA.

Note. DENNIS (1978) and MOSER (1963) state the color of the outer surface as being dark grayish brown, and LE GAL (1941) as "brun fuligineux"; in our fresh specimens, the color was distinctly dark purple, the dark brownish color appeared in old specimens only. This fungus can be easily recognized by yielding bluish latex which turns violaceous.

Peziza sepiatra Cooke, *Mycograph., Discom.*, 1: 261 (1875).
= *Plicaria sepiatra* (Cooke) Rehm, *Rabenh. Krypt.-Fl.*, 3: 1002 (1896); *Galactinia sepiatra* (Cooke) Le Gal, *Bull. Soc. mycol. Fr.*, 78: 210 (1962).
Icon. COOKE (1877: fig. 261); LE GAL (1941: 65, fig. 4); AVIZOHAR-HERSHENZON & NEMLICH (1974: 159); DONADINI (1978: 24); DENNIS (1981: pl. VII, F); BREITENBACH & KRÄNZLIN (1984: 76); MEDARDI (1997: 233-234); ELLIS & ELLIS (1998: pl. 17).

Habitat and distribution in Israel. JM: gregarious and caespitose, 1 March 1971, 14 February 1972 (AVIZOHAR-HERSHENZON & NEMLICH, 1974). Fig. 3.

Habitat and general distribution. Carbotrophs. On damp or burnt ground in forests. AFRICA: Morocco. ASIA: China, Israel,

Kazakhstan. EUROPE: Austria, Bulgaria, Denmark, Finland, France, The Netherlands, Norway, Poland, Spain, Sweden, Switzerland, Russia, Ukraine, United Kingdom.

Note. *Peziza sepiatra* is very rare species for Israeli mycobiota.

Peziza succosa Berk., *Brit. Fungi*: 156 (1841).

≡ *Galactinia succosa* (Berk.) Sacc., *Syll. Fung.*, 8: 106 (1889).

Icon. AVIZOHAR-HERSHENZON & NEMLICH (1974: 155); DENNIS (1981: pl. VI, G); BINYAMINI (1984: fig. 11); BREITENBACH & KRÄNZLIN (1984: 79).

Habitat and distribution in Israel. UG: gregarious, among litter of *Quercus calliprinos*, 6 January 1969. SP: under *Pinus halepensis*, 21 February 1972 (AVIZOHAR-HERSHENZON & NEMLICH, 1974). Fig. 3.

Habitat and general distribution. On the ground in woods. ASIA: Israel, China. EUROPE: Austria, Belgium, Bulgaria, Denmark, Finland, France, Germany, Iceland, The Netherlands, Norway, Poland, Romania, Slovenia, Spain, Sweden, Switzerland, United Kingdom. NORTH AMERICA: USA. SOUTH AMERICA: Argentina.

Note. Israeli samples have a very dark hymenium, conspicuously contrasting with the light outer surface; the plates of BRESADOLA (1933) and DENNIS (1978) do not show such a contrast (cit. in AVIZOHAR-HERSHENZON & NEMLICH, 1974). HANSEN *et al.* (2005) place this species in a group with *Peziza michelii* that yield a yellow juice.

Peziza succosella (Le Gal & Romagn.) M.M. Moser ex Aviz.-Hersh. & Nemlich, *Isr. J. Bot.*, 23 (3): 156 (1974).

≡ *Galactinia succosella* Le Gal & Romagn., *Rev. mycol. (Paris)*, 5: 113 (1940).

Icon. LE GAL (1940: 105, fig. 1-3; 1941: 64, fig. 3); AVIZOHAR-HERSHENZON & NEMLICH (1974: 155); MEDEL *et al.* (2006: 58).

Habitat and distribution in Israel. CM: scattered, among *Cistus villosus* and *C. salvifolius*, in vicinity of *Pinus halepensis*, 30 December 1969-27 February 1970; among mosses under *Cistus* sp., *Quercus calliprinos*, 9 January-16 February 1970, 23 January-1 March 1971 (AVIZOHAR-HERSHENZON & NEMLICH, 1974). Fig. 3.

Habitat and general distribution. Humus saprophyte. On the ground among mosses in forests. AFRICA: Morocco. ASIA: Israel. EUROPE: Austria, Denmark, France, Germany, Spain, Sweden, Switzerland, United Kingdom. NORTH AMERICA: Mexico, USA.

Note. *Peziza succosella* had been described by LE GAL (1940) only and cited by GRELET (1945). Israeli specimens agree with the species described by LE GAL (1940). According to AVIZOHAR-HERSHENZON & NEMLICH (1974), the apothecia of *P. succosella* is much smaller, hymenium darker and juice is more greenish-yellow than in *P. succosa*.

Peziza tenacella W. Phillips, in Cooke, *Grevillea*, 15: 100 (1887).

≡ *Humaria tenacella* (W. Phillips) Sacc., *Syll. Fung.*, 8: 145 (1889).

= *Peziza subviolacea* Svrček, *Česká Mycol.*, 32 (2): 71 (1977).

= *Peziza praetervisa* Bres., *sensu* Boudier, Dennis, Breitenbach & Kränzlin...

= *Peziza violacea* Pers., *sensu* Donadini, Hohmeyer, Dougoud; *non sensu* Bresadola, Maas Geesteranus, Breitenbach & Kränzlin (= *Peziza moseri*); *non sensu* Boudier, Dennis (= *Peziza lobulata*).

Icon. BOUDIER (1905-1910: pl. 297); LE GAL (1941: 65, fig. 4); BREITENBACH & KRÄNZLIN (1981: 56); DENNIS (1981: 67), 1984: 164, fig. 32); FRANCHI *et al.* (1992: 64-65); LUCHINI (1997: 318, pl. 88); MORENO & REMONDO (2003: 25, fig. 10).

Habitat and distribution in Israel. JM: scattered, among mosses and grasses, in vicinity of *Pinus halepensis*, 24 February 1971. SP: among mosses (*Pottia* sp.), under *Pinus* sp., 30 December 1968, 22 February 1969; on burnt ground, under *P. halepensis*, 19 January 1970, 17 February 1971, scattered among mosses, grasses and coal remnants, in vicinity of *P. halepensis*, 26 January-15 February 1972 (AVIZOHAR-HERSHENZON & NEMLICH, 1974, under *P. violacea*). CM: Bet Oren, on burnt ground in forests under *Quercus* sp. trees, 15 January 1990 (BINYAMINI, 1994, under *P. praetervisa*). Fig. 3.

Material examined. Israel, UG: Kiryat Shmona, on the ground in the *Pinus* sp. and *Eucalyptus* sp. mixed forest, 20 February 2007, leg. & det. G. Barseghyan (HAI-D-075). Fig. 3.

Habitat and general distribution. Carbotrophs. On burnt ground. ASIA: Israel. AUSTRALASIA: Australia, Tasmania. EUROPE: Austria, Czech Republic, Denmark, France, Italy, Switzerland, United Kingdom.

Note. *Peziza tenacella* is a rare species for Israeli mycobiota. *P. violacea* was first described by PERSOON in 1801, then in 1822. At this time, identification of *Peziza* species was based mostly on ascospores surface: smooth or rugged. That is why in literature we can find the description of *P. violacea* with smooth ascospores (BOUDIER, 1905; DONADINI, 1977; DENNIS, 1978) and *P. violacea* with rugged ascospores (SEEVER, 1928; DONADINI, 1981; HOHMEYER, 1986). Besides, some authors identified this fungus with rugged ascospores as *P. praetervisa* Bresadola (1897), which is in fact *P. petersii* Berk.; that is why the name "*praetervisa*" created additional doubt. Finally, SVRČEK (1977) made new interpretation of this fungus with rugged ascospores as *P. subviolacea*, which was accepted by such a famous mycologists as Donadini and Korf (MONTI *et al.*, 1992).

Nowadays, *P. subviolacea* is considered by many taxonomists to be synonymous with *P. tenacella* W. Phillips.

Peziza varia (Hedw.) Fr., *Syst. Mycol.*, 2 (1): 61 (1822).

≡ *Galactinia varia* (Hedw.) Le Gal, *Bull. Soc. mycol. Fr.*, 78: 210 (1962); *Geopyxis varia* (Hedw.) Rehm, *Rabenh. Krypt.-Fl.*, 3.: 975 (1896); *Aleuria varia* (Hedw.) Boud., *Hist. Classif. Discom. Eur.*: 46 (1907); *Humaria varia* (Hedw.) Sacc., *Syll. Fung.*, 8: 142 (1889).

= *Aleuria varia* f. *typica* Bres., *Fungi Trident.*, 2: 75 (1898).
Icon. AVIZOHAR-HERSHENZON & NEMLICH (1974: 159); DENNIS (1981: pl. V, E); BINYAMINI (1984: fig. 12); BREITENBACH & KRÄNZLIN (1984: 79).

Habitat and distribution in Israel. SP: caespitose and scattered, among building debris in a courtyard, under fruit trees, 21 February 1968. PP: in a greenhouse among tomato seedlings, 15 March 1971 (AVIZOHAR-HERSHENZON & NEMLICH, 1974). Fig. 3.

Habitat and general distribution. Humus saprophyte. Wood of deciduous trees. ANTARCTICA. ASIA: Israel. AUSTRALASIA: Australia, New Zealand. EUROPE: Austria, Bulgaria, Denmark, Finland, France, Germany, Italy, Norway, Poland, Slovenia, Spain, Sweden, Switzerland, United Kingdom. NORTH AMERICA: USA.

Note. This species is separable from other similar species by the moniliform paraphyses. Of the three types of *Peziza varia* described by BRESADOLA (1933), Israeli specimens correspond to forma *typica*, which is also fits the description of DENNIS (1978), including the several-layered structure of flesh and distinctive form of paraphyses with their inflated, coin-like cells.

According to BREITENBACH & KRÄNZLIN (1984), *P. varia* is a species which is difficult to separate, especially from *P. cerea*. The most important characteristics are, first, the distinctly layered trama in which the middle layer of longitudinal hyphae appears as dark lines, and secondly the form of the paraphyses, which separates from *P. cerea* among others. According to DONADINI (1979), *P. cerea* has slightly punctate ascospores.

According to WEBSTER *et al.* (1964), the conidial state of *P. varia* is *Oedocephalum* type.

Peziza vesiculosa Bull., *Herb. Fr.*: 10 (1790).

≡ *Scodellina vesiculosa* (Bull.) Gray, *Nat. Arr. Brit. Pl.*, 1: 669 (1821); *Pustularia vesiculosa* (Bull.) Fuckel, *Jb. nassau. Ver. Naturk.*, 23-24: 329 (1870); *Aleuria vesiculosa* (Bull.) Gillet, *Champ. Fr., Discom.*: 45 (1879); *Galactinia vesiculosa* (Bull.) Le Gal, *Discom. Madagascar*: 33 (1953).

Icon. COOKE (1877: pl. 57); GILLET (1879: pl. 42); SEAVER (1915: pl. CLV); AVIZOHAR-HERSHENZON & NEMLICH (1974: 159); DENNIS (1981: pl. V, G); PHILLIPS (1981: 268); BREITENBACH & KRÄNZLIN (1984: 79).

Habitat and distribution in Israel. NN: caespitose, among seedlings of cucumber in a greenhouse, 9 December 1971, leg. H. Krikun (AVIZOHAR-HERSHENZON & NEMLICH, 1974); Negev (W'Arad), on old dung of camel and on the sterile paper placed underneath it, 25 April 1971; North Sinai Desert, on old dung of camel, 12 January 1972 (BINYAMINI, 1973). Fig. 3.

Material examined. Israel, SH: Yacir Shimshon, on cow manure, 26 February 2007, leg. Y. Ur, det. G. Barseghyan (HAI-D-094). Fig. 3.

Habitat and general distribution. Humus saprophyte. On rich soil and manure pile in the open. AFRICA: MOROCCO. AUSTRALASIA: New Zealand. ASIA: China, Israel, Japan, Korea, Turkey. EUROPE: Austria, Bulgaria, Czech Republic, Denmark, Finland, France, Germany, Italy, The Netherlands, Norway, Poland,

Romania, Slovenia, Spain, Sweden, Switzerland, United Kingdom. NORTH AMERICA: USA. SOUTH AMERICA: Chile.

Note. *Peziza bovina*, has similar ascospores, 19–22 × 9 (10) μm, borne by small (under 1 cm) umber-brown apothecia on cow dung (cit. in DENNIS, 1981). According to STALPERS (1974), the conidial state is *Oedocephalum pallidum* (Berk. & Broome) Constantin ex Thaxt.

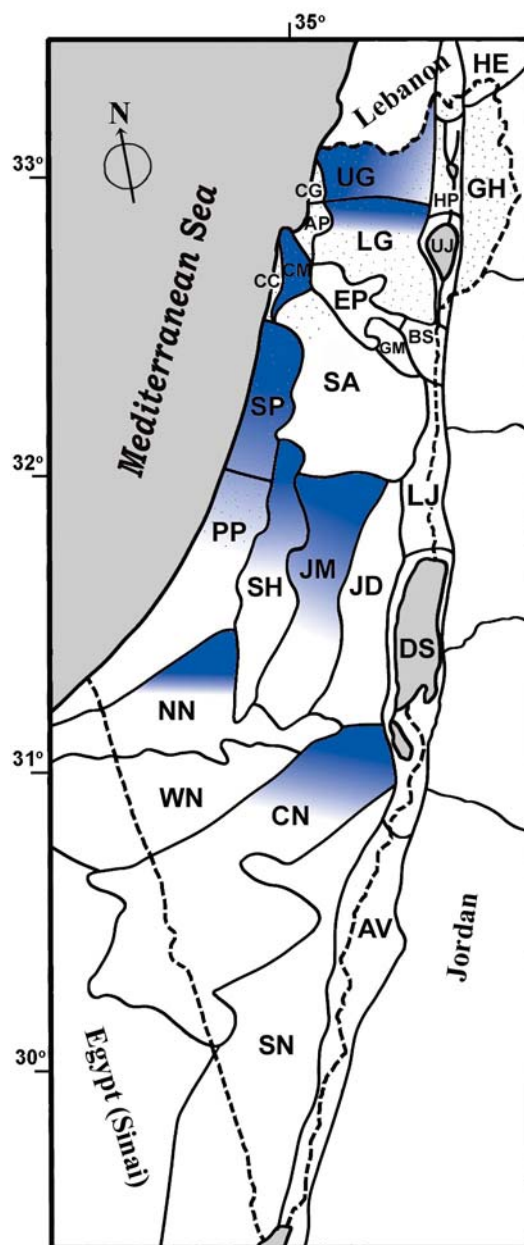


Fig. 3. — Species diversity of genus *Peziza* in Israel.

Accepted abbreviations of nature regions of Israel: AP – Akko Plain; AV – Arava Valley; BS – Beit Shean Valley; CC – Carmel Coast; CG – Coast Galilee; CM – Carmel Mount; CN – Central Negev; DS – Dead Sea Area; EP – Esdraelon (Yizre'el) Plain; GH – Golan Heights; GM – Gilboa Mount; HE – Hermon Mount; HP – Hula Plain; JD – Judean Desert; JM – Judean Mts.; LG – Lower Galilee; LJ – Lower Jordan Valley; NN – Northern Negev; PP – Philistean Plain; SA – Samaria; SH – Shefela; SN – South Negev; SP – Sharon Plain; UG – Upper Galilee; UJ – Upper Jordan Valley; WN – Western Negev.

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