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Lichenicolous fungi from Campania (Italy)

Abstract

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During a two weeks excursion to Campania in 2016, 36 lichenologically interesting sites were visited. The results of these field studies with special emphasis on lichenicolous fungi are presented, completed with data from the literature. The resulting list comprises 56 species based on original data (own recent records) and 29 species known only from literature ; now 85 species of lichenicolous fungi are known from Campania (80 non-lichenized, obligatory lichenicolous fungi). Among these, one species (*Microsphaeropsis lichenicola*) is new to Europe, one species (*Feltgeniomyces luxemburgensis*) is new to Italy and 47 species are new to Campania. The new species *Endococcus collematis* Brackel is described. Provisional descriptions are given for *Arthonia* sp. (on *Pannaria conoplea*), *Capronia lecanorae* ad int. (on *Lecanora horiza*), *Lichenopeltella lecanoricola* ad int. (on *L. horiza*), *Polycoccum* sp. (on *Romjularia lurida*) and *Stigidium* sp. (on *Xanthoparmelia conspersa*). In the Table 1, a list of all noted lichens from the 36 visited sites is given.

Key words: Ascomycotina, Basidiomycotina, lichens, *Endococcus*, *Lichenopeltella*, Mediterranean

Introduction

Whereas the lichens of Italy are well studied, the knowledge of lichenicolous fungi of the country is still poor as since the times of Massalongo, Arnold, Jatta and other pioneers of lichenology no systematic efforts were done in this field. To help increase the knowledge of these organisms we started a project “Lichenicolous fungi of Italy”, beginning with an excursion to Sicily in 2006. In the succeeding years, several other regions followed (references listed in Brackel 2016; Brackel & Berger 2019; Brackel 2020). Up to now, almost 700 localities were investigated. This paper is addressed to the Campania.

Campania is a region in southern Italy between the coast of the Tyrrhenian Sea and the crest of the southern Apennines, up to 2050 m. Whereas the region around the regional capital Napoli is densely populated and the lowlands are intensively used for agriculture due to the fertile volcanic soil, the mountains (the Apennines and the isolated Cilento) are rich in natural and semi-natural landscapes such as wide forests and extensively used pastures.

The climate is Mediterranean with warm spring and autumn, hot summer and mild

winter except for the harsh winter conditions in the higher mountains. Situated on the western side of the Apennines, Campania is exposed to the humid Atlantic winds and the precipitation is rather high except for some coastal areas and the landscape in the leeward of the Apenninan ridge; in the mountains the precipitation reaches 2000 mm/year (Ducci & Tranfaglia 2005; <http://www.campaniameteo.com>).

Regarding the study of lichens the region is moderately well explored with 846 species of lichens listed in Nimis (2016). Up to now the knowledge of lichenicolous fungi in the region was rather poor, although the exploration began more than one hundred years ago with Jatta (1875, 1880, 1882, 1889, 1892, 1909–1911), who reported twelve species. Some additions were made only in the present century by G. Aprile, G. Brunialti, I. Catalano, P. L. Nimis, D. Puntillo, S. Ravera, M. Tretiach and others who reported some species familiar to lichenologists. Puntillo & Brackel (2017) added 15 species from Ischitella. All this results in 38 species of lichenicolous fungi already known from the region listed in Brackel (2016).

In summer 2016, 35 lichenologically interesting sites were visited during a two-week excursion to collect lichenicolous fungi (Fig. 1). Here, the results of the investigation are presented.

Material and Methods

The specimens were studied with a Zeiss stereo microscope at magnifications up to $\times 40$ and an Olympus BX 51 microscope fitted with Nomarski differential interference contrast optics at magnifications up to $\times 1000$. Measurements were taken on thin hand-cut sections mounted in water. Statistical measurements are indicated as (minimum–) {X-SD} – {X+SD} (–maximum), followed by the number of measurements (n) when $n \geq 10$; the length/breadth ratio of ascospores and conidia is indicated as l/b and given in the same way. The following standard reagents and stainings were used for the species identification: 10% potassium hydroxide (K), Lugol's solution (I, K/I with pretreatment with K), paraphenylenediamine (P), sodium hypochlorite (C), phloxin and cotton blue. The examined specimens, with the exception of repetitive samples of common and well known species (such as *Athelia arachnoidea* or *Licheniconium erodens*) are housed in the private herbarium of Wolfgang von Brackel (hb Brackel). All specimens were collected by Wolfgang & Gisela von Brackel and determined by the author. Geographical names are in Italian, with the exception of those taken from literature.

Species names supported by original data are written in bold. The bold numbers following the species name (456–467, 469–474) indicate the localities listed below; here the original numbers of the entire project are used. The distribution of species in Italy is given after Brackel (2016), in Europe and the world after Brackel (2014); for those not listed in these papers it is documented with citations of the respective publications. Species new to Campania are indicated with one asterisk (*), species new to Italy with two asterisks (**). Slightly lichenized species are indicated with an “L”, saprophytes with a lichenicolous habit with an “S”. Dubious records from the literature are put between question marks (¿...?).



Fig. 1. Location of the collection sites 468 and 475–509 in the Campania region. As this study is part of a larger project (the lichenicolous fungi of Italy), here the original numbers of locations are used to avoid confusion.

Localities

Italy, Campania (BN = Benevento, CE = Caserta, NA = Napoli, SA = Salerno), leg. W. & G. v. Brackel, det. W. v. Brackel: **468**: BN, Bosco di Decorata S Riccia, $41^{\circ}25'21,3''N$, $14^{\circ}52'29,4''E$, , 800 m, oak forest at the lakeside, on *Quercus pubescens*, 12.08.2016. – **475**: BN, Monti del Matese, Bocca della Selva ENE Piedimonte, $41^{\circ}22'53,3''N$, $14^{\circ}29'44,4''E$, 1385 m, beech forest, on *Fagus sylvatica*, 14.08.2016. – **476**: BN, Monti del Matese, Bocca della Selva ENE Piedimonte, $41^{\circ}22'30,2''N$, $14^{\circ}30'50,4''E$, 1310 m, sparse dry grassland pasture, 14.08.2016. – **477**: CE, Monti del Matese, above Lago del

Matese, 41°25'44,9"N, 14°21'17,7"E, 1115 m, sparse dry grassland with limestone outcrops, 15.08.2016. – **478**: CE, Monti del Matese, Lago di Gallo, N shore, 41°27'46,0"N, 14°14'04,0"E, 840 m, hedge of *Prunus spinosa*, 15.08.2016. – **479**: CE, Monti del Matese, W Gallo Matese, 41°27'50,0"N, 14°12'36,0"E, 835 m, bushes of *Prunus spinosa*, 15.08.2016. – **480**: CE, Monti del Matese, near the pass NW Lago del Matese, 41°26'06,0"N, 14°20'56,8"E, 1165 m, beech forest, on *Fagus sylvatica*, 15.08.2016. – **481**: SA, Cilento, Grotta del Bussento near Morigerati, 40°08'33,3"N, 15°33'01,2"E, 135 m, mixed forest in a whitewater gorge, on bark (a), on limestone rocks (b), 17.08.2016. – **482**: SA: Cilento, Valle del Bussentino below Morigerati, Ponte dei Normanni, 40°08'20,0"N, 15°33'50,4"E, 130 m, on limestone, 17.08.2016. – **483**: SA, Cilento, road from Morigerati to Casaletto Spartano near the junction to Caselle Pittari, 40°09'30,6"N, 15°33'41,6"E, 510 m, oak forest, on *Quercus ilex*, 17.08.2016. – **484**: SA, Cilento, Valle del Bussentino near Casaletto Spartano, 40°10'01,1"N, 15°38'00,8"E, 570 m, limestone rocks in the forest, 17.08.2016. – **485**: SA, Cilento, between Torre Orsaia and Alfano, 40°10'31,6"N, 15°26'49,5"E, 340 m, olive grove, on *Olea europaea*, 18.08.2016. – **486**: SA, Cilento, Forra dell'Emmisi near Rofrano, 41°12'56,4"N, 15°24'57,9"E, 365 m, gorge forest, on bark, 18.08.2016. – **487**: SA, Cilento, S Massinelle, 40°08'08,9"N, 15°19'43,8"E, 335 m, olive grove, on *Olea europaea*, 18.08.2016. – **488**: SA, Cilento, between Perito and Orria, 40°18'43,4"N, 15°10'44,9"E, 600 m, olive grove with oaks, on *Quercus pubescens* (a), on *Olea europaea* (b), 19.08.2016. – **489**: SA, Cilento, road from Orria to Stio, junction Gioi, 40°18'21,1"N, 15°13'00,2"E, 720 m, on *Pyrus communis* (a), on *Alnus cordata* (b), 19.08.2016. – **490**: SA, Cilento, W Stio, 40°18'46,5"N, 15°13'31,7"E, 745 m, oak forest, on *Quercus pubescens* (a), on an old wooden post (b), 19.08.2016. – **491**: SA, Cilento, Santoianni SE Felitto, 40°21'25,3"N, 15°16'10,5"E, 380 m, olive grove, on *Olea europaea*, 20.08.2016. – **492**: SA, Cilento, N Stio below Magliano Nova, 40°20'01,5"N, 15°15'53,7"E, 560 m, on limestone rocks, 20.08.2016. – **493**: SA, Cilento, Felitto, Gola del Calore, 41°21'25,5"N, 15°14'47,3"E, 350 m, on *Ostrya carpinifolia*, 20.08.2016. – **494**: SA, Cilento, between Felitto and the junction Stio-Laurino, 40°20'44,1"N, 15°17'06,7"E, 370 m, oaks near the roadside, on *Quercus pubescens*, 21.08.2016. – **495**: SA, Cilento, Sella di Corticato, 40°23'01,9"N, 15°25'52,3"E, 1010 m, chestnut forest, on *Castanea sativa*, 21.08.2016. – **496**: SA, Cilento, Passo della Sentinella, 40°25'09,6"N, 15°25'04,3"E, 955 m, oak forest, on *Quercus pubescens* (a), on *Fraxinus excelsior* (b), on *Alnus cordata* (c), in sparse dry grassland with limestone outcrops (d), 21.08.2016. – **497**: SA, Cilento, Sacco, Sorgenti del Sammaro, 40°23'00,3"N, 15°21'50,8"E, 395 m, on *Prunus spinosa* (a), on *Ostrya carpinifolia* (b), 22.08.2016. – **498**: SA, Cilento, San Mango SE Agropoli, Molino, 40°15'41,8"N, 15°03'45,5"E, 575 m, on *Alnus glutinosa*, 23.08.2016. – **499**: SA, Cilento, Omignano SE Agropoli, 40°15'04,1"N, 15°04'50,8"E, 520 m, on *Hibiscus* trees near the roadside in the village, 23.08.2016. – **500**: SA, Cilento, between Omignano Scalo and Santa Lucia, 40°15'47,1"N, 15°05'37,2"E, 220 m, olive grove, on *Olea europaea*, 23.08.2016. – **501**: SA, Valle della Sele, NW Serre, 40°36'44,9"N, 15°08'52,2"E, 110 m, olive grove, on *Olea europaea*, 24.08.2016. – **502**: SA, Costiera Amalfitana, Amalfi, Valle delle Ferriere, 40°38'47,9"N, 14°35'24,1"E, 200 m, oak forest, on *Quercus ilex*, 25.08.2016. – **503**: NA, Vesuvio, crater rim above Ercolano, 40°49'12,9"N, 14°25'24,4"E, 1180 m, on lava rocks, 28.08.2016. – **504**: NA, Vesuvio, W flank, 40°49'26,7"N, 14°24'41,3"E, 805 m, on lava rocks, 29.08.2016. – **505**: CE, Pineta di Sessa W Sessa Aurunca, 41°12'48,3"N,

13°47'01,3"E, 5 m, dune bushes, on *Pistacia lentiscus*, 29.08.2016. – **506**: CE, between Sessa and Roccamonfina, 41°15'21,6"N, 13°56'32,7"E, 315 m, olive grove, on *Olea europaea*, 30.08.2016. – **507**: CE, Parco del Roccamonfina, Monte Santa Croce, near the santuario, 41°18'08,1"N, 13°59'07,1"E, 765 m, chestnut grove, on *Castanea sativa* (a), on *Tilia* sp. (b), on soil (c), 30.08.2016. – **508**: CE, Parco del Roccamonfina, between Conca and Galluccio, 41°20'34,5"N, 13°57'58,5"E, 375 m, orchard, on *Prunus avium* (a), on *Olea europaea* (b), 30.08.2016. – **509**: CE, Parco del Roccamonfina, S Galluccio, NW Sipicciano, 41°19'34,6"N, 13°56'27,4"E, 435 m, magma rocks under oaks, 30.08.2016.

Results

The field studies, completed with data from the literature, result in a list comprising 56 species based on original data (own recent records) and 29 known only from literature; now 85 species of lichenicolous fungi are known from Campania (80 non-lichenized, obligatory lichenicolous fungi). Among these, one species (*Microsphaeropsis lichenicola*) is new to Europe, one species (*Feltgeniomyces luxemburgensis*) is new to Italy and 47 species are new to Campania.

As a matter of course, a two-week excursion and the data of the scarce literature will show only a small part of the biodiversity of lichenicolous fungi of the region. In Calabria, a better explored comparable region, 151 taxa of lichenicolous fungi are known. The number of lichenicolous fungi in a defined area is correlated to the number of lichens as their potential hosts. Zhurbenko (2007) introduced the “lichenicolous index (LI)”, defined as the taxa of lichenicolous fungi per taxa of lichens within a region. The LI for Campania is 0.10, for Calabria 0.15. All over Italy the LI is 0.18. In relatively well-explored regions the index reaches more than 0.2: British Isles 0.25, Belgium, Luxemburg & Northern France 0.22, Bavaria 0.25. A rough estimate leads to the conclusion, that the LI (at least in Europe) should reach 0.3–0.4 in reality. As also the number of known lichens in Campania should increase significantly with intensified exploration, we presume that the real number of lichenicolous fungi in Campania ranges between 350 and 500.

About the role of lichenicolous fungi in ecosystems almost nothing is known, but presumably it will not be that important. One of their functions is (according to own observations) is their aid in the turnover of lichen societies, as the aggressive species among them lower the density of lichen covers and allow new individuals to start a life cycle. On the other hand, the diversity and composition of lichenicolous fungi in a certain area gives a hint on the naturalness of the site. Non-aggressive specialists (e.g., *Abrothallus suecicus*) prefer (semi-)natural habitats with a long tradition, whereas aggressive generalists (e.g. *Athelia arachnoidea*) or species with a semi-saprophytic habit (e.g., *Cladophorium licheniphilum*) prefer areas with weakened lichens, for instance due to air pollution. As we studied mainly (semi-) natural habitats and the number of investigated locations is small, an evaluation of our results regarding this question is not possible.

Despite of an enormous increase of knowledge on lichenicolous fungi in the last 40 years there are still vast blank spots. Among the c. 90 specimens from Campania kept in the personal herbarium of the author 13 specimens cannot be ascribed to a known species, apart from the below mentioned “Undescribed species”.

Moreover, several genera (e.g. *Endococcus*, *Muellerella*) contain undissolved aggregates of surely different taxa and many anamorph-teleomorph relationships are still undiscovered or at least uncertain. Molecular investigations surely will help to solve many problems, but indispensable is the collection of specimens in the field and their morphological analysis. This study, amongst others with the description of a new taxon from the *Endococcus perpusillus* aggregate, makes a small contribution to the closing of gaps.

**Abrothallus suecicus* (Kirschst.) Nordin

496a: on *Ramalina fastigiata*, thallus (hb Brackel 8286, anamorph & teleomorph). This widely distributed species is a parasite of different *Ramalina* species and known from several regions in Italy, mainly from the south. Most Italian records refer to the anamorphic state of the species (“*Vouauxiomyces ramalinae* (Nordin) D. Hawksw.”).

¿*Arthonia caerulescens* (Almq.) R. Sant.?

Jatta (1889: 190; 1892: 210) reported *Arthonia glaucomaria* Nyl. on the apothecia of *Lecanora varia* from Ischia (“Apothecia minuta, atra, rugosa. Asci clavati. Sporae e cuneiformibus ovatae, utrinque obtusae, tetrablastae, loculis aequalibus”). As the name *A. glaucomaria* formerly was used in a wider sense, the assignment to a species is dubious until the specimen will be re-examined. Nevertheless, *A. caerulescens* is the only *Arthonia* species growing on the apothecia of *Lecanora varia*.

Arthonia diploiciae Calatayud & Diederich

Puntillo & Brackel (2017) reported the species from Ischitella on *Diploicia canescens*.

**Arthonia epiphyscia* Nyl.

505: on *Hyperphyscia adglutinata*, thallus (hb Brackel 8561).

Apothecia arthonioid, more or less superficial, black, c. 120 µm diameter, hypothecium brown, hymenium subhyaline, epithecium pale olive, asci c. 20–22 × 10–15 µm, ascospores 1-septate, soleiform, hyaline, smooth, c. 8–10 × 3.5–4.5 µm. *Hyperphyscia* is a new host genus for the species reported so far from *Physcia* spp. *Arthonia epiphyscia* is a worldwide distributed species, in Italy known from Abruzzo, Calabria, Sardegna and Toscana.

**Arthonia parietinaria* Hafellner & A. Fleischhacker

All on the thallus and partly on the apothecia of *Xanthoria parietina*: **479** (hb Brackel 8560); **478**; **491**; **499**; **508b**.

This widely distributed species, confined to *X. parietina*, was only recently separated from *A. molendoi* (Heufl. ex Frauenf.) R. Sant. (Fleischhacker & al. 2016). It is known from several Italian regions; most older records of *A. molendoi* from Italy refer to this species.

¿*Arthonia urceolata* (Elenkin) V.J. Rico, Calat. & Barreno?

Jatta (1909–1911: 760) reported *A. glaucomaria* “in thallo *Aspiciliae calcareae* L. in Etruria et in Campania”. *A. urceolata* is known from Asia and from Spain (Calatayud & al. 2004) on different vagrant species of *Aspicilia*, but also on *A. calcarea* (Etayo 2008). The specimen of Jatta should be checked.

***Arthrorhaphis aeruginosa* R. Sant. & Tønsberg**

477: on *Cladonia pocillum*, basal squamules (hb Brackel 8401).

This species, widely distributed in Europe and also known from Asia and both Americas, confined to hosts of the genus *Cladonia*, was already known from Campania: Ischitella on *Cladonia pyxidata* (Puntillo & Brackel 2017). It is known from several Italian regions, always growing on the squamules of *Cladonia* species.

****Athelia arachnoidea* (Berk.) Jülich**

485: on *Parmelina quercina*, *Ramalina fastigiata*, thallus and apothecia (hb Brackel 8545).

This aggressive parasite of a multitude of mostly epiphytic lichens, also spreading over adjacent bryophytes and bark, has an almost worldwide distribution. It is found mainly in urban environment with polluted air, probably profiting from the weakened lichens due to the intoxication.

***Buelliella minimula* (Tuck.) Fink**

Puntillo & Brackel (2017) reported the species from Ischitella on *Pertusaria* sp.

****Buelliella physciicola* Poelt & Hafellner (Fig. 2)**

501: on *Phaeophyscia orbicularis* (hb Brackel 8577).

This is the second record of the species for Italy; the first one was made by Camillo Sbarbaro 1955 in Liguria (Hafellner 1979). The species has a wide distribution but seems to be quite rare.

***Carbonea vitellinaria* (Nyl.) Hertel**

Catalano & al. (2016) reported this species from the Roccamonfina volcano on *Candelariella vitellina*.

^L*Catillaria mediterranea* Hafellner s. str.

A slightly lichenized species growing on different foliose and fruticose lichens, mainly on *Anaptychia ciliaris*. Garofalo & al. (2010) reported *Catillaria mediterranea* as epiphytic on the bark of *Castanea sativa* without mentioning the lichenicolous habit. Most probably this record refers to the free living sister species *Catillaria servitii* Szatala. Consequently *Catillaria mediterranea* should be deleted from the species list of the region.

^L*Catillaria nigroclavata* (Nyl.) Schuler

485a: on *Parmelina quercina*, thallus (hb Brackel 8547); **506:** on *Hyperphyscia adglutinata*, thallus (hb Brackel 8588).

Thallus very thin or reduced to a few minute granules, apothecia lecideine, black, hypothecium pale brown, paraphyses septate, ramified, apically swollen with a distinct dark brown cap, asci 8-spored, tholus and outer coat K/I+ uniformly blue, ascospores 1-septate, hyaline, 8–9 × 2.5–3 μm. Usually an autonomous lichen, the species also grows on other mostly foliose lichens where it seems to be parasitic, as the thallus is even more reduced than in the autonomous specimens.

Catillaria nigroclavata is known as an autonomous lichen from several locations in Campania (see e.g. Nimis & Martellos 2020). Lichenicolous records are reported only from Europe, mostly on foliose and fruticose lichens.

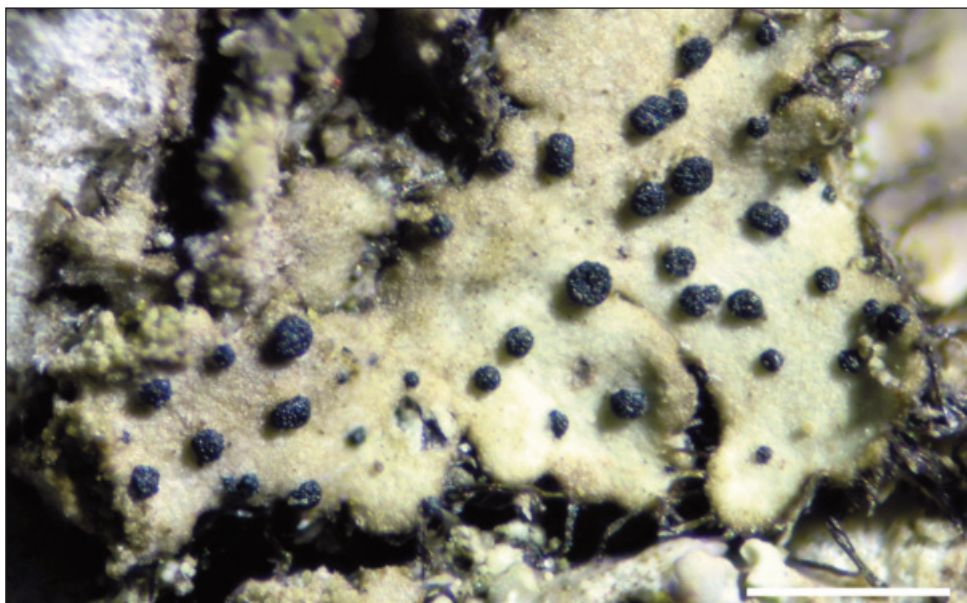


Fig. 2. *Buelliella physciicola* on the thallus of *Phaeophyscia orbicularis*, Campania, Valle della Sele, 2016. Bar = 0.5 mm.

^S*Chaenothecopsis pusilla* (Ach.) A.F.W. Schmidt

This species commonly grows saprophytically on bark but also on algae and various lichens. Jatta (1882: 113) reported it as *Calicium pusillum* on the trunks of *Castanea sativa* from Ischia.

**Cladosporium licheniphilum* Heuchert & U. Braun

475: on *Lecanora horiza*, thallus and apothecial discs (hb Brackel 8584, in the specimen of *Lichenopeltella lecanoricola* ad int.); **485:** on *Ramalina farinacea*, thallus; **488a:** on *Pertusaria hymenea*, thallus (hb Brackel 8594); **495:** on *Physcia aipolia*, apothecial margin; **505:** on *Xanthoria parietina*, thallus and apothecia (hb Brackel 8562, in the specimen of *Pyrenochaeta xanthoriae*).

The species was described to be confined to the apothecia of *Pertusaria alpina* (Heuchert & Braun 2006), but subsequently it was found on the thallus as well as on the apothecial discs of several crustose, foliose, and fruticose lichens. It is an aggressive parasite with an Eurasian distribution.

Clypeococcum psoromatis (A. Massal.) Etayo

Nimis & Tretiach (2004) reported the species from the Valle del Bussento between Vibonati and Sicili without mentioning a host. Most probably it grew on *Squamarina cartilaginea*, as this is the only species from the genus *Squamarina* mentioned for the locality; *C. psoromatis* is restricted to hosts of this genus.

****Didymocyrtis cladoniicola*** (Diederich, Kocourk. & Etayo) Ertz & Diederich

468: on *Ramalina fastigiata*, thallus (hb Brackel 8280, anamorph).

This species is widely distributed over the northern hemisphere and known in Italy from several regions (Abruzzo, Calabria, Emilia-Romagna, Friuli-Venezia Giulia, Lazio, Molise, Toscana), mostly in the anamorphic state (“*Phoma cladoniicola* Diederich, Kocourk. & Etayo”). The typical host genus of the species is *Cladonia*, but it was reported also on some foliose lichens, mainly of the family Parmeliaceae and Ramalinaceae (Ertz & al. 2015).

****Didymocyrtis epiphyscia*** Diederich & Ertz s. str.

468: on *Anaptychia ciliaris*, thallus (hb Brackel 8570, anamorph); **479:** on *Physcia adscendens*, thallus (hb Brackel 8573, anamorph).

In its strict sense this species is reported from several European countries and from North America. In Italy it was known until now only from Calabria. The species is known only in its anamorphic state (“*Phoma physciicola* Keissler”).

****Didymocyrtis melanelixiae*** (Brackel) Diederich, Harris & Etayo

490a: on *Melanelixia glabra*, thallus (hb Brackel 8549, anamorph).

This widely distributed but quite rarely reported species was known in Italy from Basilicata, Calabria, Sardegna and Toscana; all Italian records refer to the anamorphic state (“*Phoma melanelixiae* Brackel”).

****Didymocyrtis ramalinae*** (Roberge ex Desm.) Ertz & al.

489a: on *Ramalina fastigiata*, thallus (hb Brackel 8285, teleomorph).

The most common species of the genus *Didymocyrtis* on *Ramalina* in Italy is *Didymocyrtis ramalinae*, often in the anamorphic state (“*Phoma ficuzzae* Brackel”). It is widely distributed in Europe and rarely reported from Asia, Africa and Australia (Hafellner 2015, Urbanavichus & Urbanavichene 2015). Rarely also *D. cladoniicola*, common on *Cladonia* species, is found on *Ramalina* (see above).

****Didymocyrtis slaptioniensis*** (D. Hawksw.) Hafellner & Ertz

478: on *Xanthoria parietina*, thallus; **479:** on *X. parietina*, thallus (hb Brackel 8560, in the specimen of *Arthonia parietinaria*).

This species is widely distributed over Europe, always growing on *Xanthoria parietina*. In Italy it was found in several regions. The records from Campania refer to the anamorphic state.

Diplolaeviopsis ranula Giralt & D. Hawksw.

One record of the species from Campania was found in Suija & al. (2014): Salerno, Morigerati, Gole del Bussento, on *Lecanora strobolina*, 28.7.1997, D. Puntillo (hb Diederich).

Endococcus collematis Brackel species nova (Figs. 3, 4)

Mycobank number MB839368

Similis fungo lichenicola *Endococcus pseudocarpus* Nyl., sed ascosporibus cellulis aequalis, agustioribus, (8.0–)10.9–14.6(–17.0) × (3.0–)3.6–4.6(–5.0) μm.

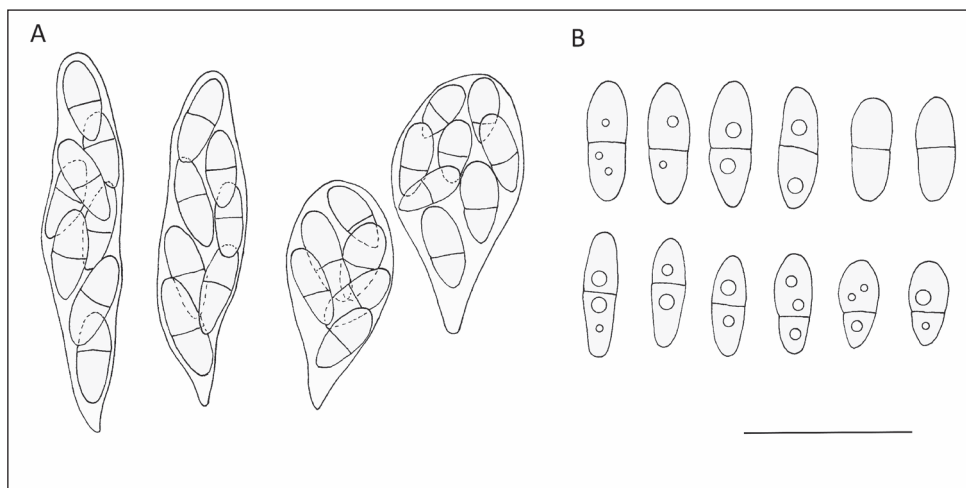


Fig. 3. *Endococcus collematis*. A: Asci. B: Ascospores released from the asci. Bar = 20 μ m.

Typus: Italy, Calabria, Prov. di Cosenza, Valle del Caronte, S. Maria di Mendicino, limestone rocks near the road, on *Lathagrium auriforme*, 515 m, 39°15'18,5"N, 16°12'10,4"E, 27.04.2014, W. v. Brackel & D. Puntillo (M – holotypus).

The specimen was reported in Brackel & Puntillo (2016) as *E. pseudocarpus* Nyl. with the remark “belongs to the taxon with narrow ascospores within the *E. pseudocarpus* complex”.

Ascomata perithecioid, black, shiny in exposed parts, (sub)globose, ostiolate, 120–200 μ m diameter, first completely immersed, then to 1/4 erumpent, dispersed or in loose groups, inducing galls-like swellings of the host thallus due to the growth of the perithecia.

Wall dark brown, K– or K+ slightly darker, in surface view of textura angularis, composed of cells 2–7 μ m diameter, in section c. 12 μ m thick, formed of 4–5 layers of radially compressed cells, cells 3–9 \times 2–3 μ m, inner layers subhyaline, outer ones brown; immersed part of the perithecia covered by an additional layer of radially compressed hyaline cells, 6–8 μ m thick, probably originating from dead host cells, compressed by the growth of the perithecia. **Interascal gel** I+ and K/I+ slightly orange. **Hamathecium** of periphyses lining the ostiole channel, hyaline, not ramified, septate, up to 10 μ m long, 1.5–2 μ m wide, interascal filaments not observed. **Asci** clavate, 40–55 \times 10–13 μ m, (4–)8-spored, ascospores irregularly 2(–3)-seriate, endoascus KI+ orange. **Ascospores** uniformly pale (rarely to medium) brown, smooth-walled, wall thin or of medium thickness, often misbuilt, guttulate, narrowly ellipsoid to fusiform, straight to slightly curved, slightly attenuated or rarely rounded at both ends, not or slightly constricted at the septum, both cells of nearly equal size and shape, eventually the lower one slightly more attenuated, (8.0–)10.9–14.6(–17.0) \times (3.0–)3.6–4.6(–5.0) μ m, l/b = (2.0–)2.6–3.7(–5.0) (n = 190). **Conidiomata** not seen.

Host and distribution: *Endococcus collematis* grows on the thallus of *Collema* s. lat. (*Collema nigrescens*, *Enchylum tenax*, *Lathagrium auriforme* and *L. undulatum*) without causing visible damages, appearing to be a parasymbiont; the growth of the perithecia causes gall-like swellings on the host thallus. Until now it is known with certainty from the

regions Abruzzi, Calabria and Campania in Italy, from one site in Switzerland and from three different regions in Bavaria (southern Germany).

Several reports of *E. pseudocarpus* growing on *Collema* s. lat. with ascospores less than 5 µm broad most probably belong to the new species: Lopez de Silanes & al. (2009) reported *E. pseudocarpus* with narrow ascospores (13–15 × 3–4 µm) on *Lathagrium cristatum*, *L. fuscovirens*, *Callome multipartita* and *Collema* sp. from Spain. Etayo (2010b) reported it also from Spain, on *Lathagrium cristatum* and *L. fuscovirens*, with ascospores 14–15 × 3.5–4.5 µm. Zhurbenko (2013) reported *E. pseudocarpus* on *Enchylium polycarpon* from Asian Russia with ascospores of (8.7–)11.5–14.1(–15.5) × (3.5–)4.0–4.6(–5.0) µm. Several other reports of *E. pseudocarpus* on *Collema* spp. cannot be assigned to the new species due to the missing ascospore measurements.

Observations: *Endococcus perpusillus* was described by Nylander (1873: 204) on *Peltula euploca* (“*Heppia guelpini* var. *nigrolimbata*”) with ascospores 9–18 × 5–7 µm. Later the name (or a combination of it) was used also for specimens of *Endococcus* on hosts of other lichen genera with a cyanobacterial photobiont, such as *Collema* s. lat., *Leptogium* s. lat. and *Placynthium subradiatum* (Vouaux 1913: 53 under inclusion of *E. peltax* Nyl., Hafellner 1994, 2002 and several others). Keissler (1930: 396) used a very broad concept including also specimens on genera such as *Rhizocarpon*, *Lecidea* and *Lecanora*. Triebel (1989) presumed *E. pseudocarpus* to be identical with *E. perpusillus*.

Since Triebel (1989) presented her broad concept of *Endococcus* it was shown, that the species of the genus are much more specific and almost all of them are confined to one host genus, a group of species within one genus or even one species. Several aggregates such as *E. perpusillus* s. lat., *E. propinquus* s. lat. or *E. rugulosus* s. lat. had to be split up into host-specific species, a still not finished process. This seems to be the case also in *E. pseudocarpus*. In addition to intensified morphological and ecological investigations molecular studies could be useful to better clarify some taxonomical problems in *Endococcus*.

Unfortunately we could not study the type of *E. pseudocarpus*, but the indication of the ascospore measurements in the protologue (9–18 × 5–7 µm) shows clearly the difference to the new species with ascospores never wider than 5 µm. The measurements of Nylander (1873) are confirmed by the only additional find of *E. pseudocarpus* on *Peltula* we could trace (Kocourková-Horáková 1998: 231), where the ascospores are given with 15.5–20 × 5.5–6.5 µm. In this specimen the ascospores are described as having unequal cells, the lower ones narrower and longer than the upper ones, elongated, somewhat caudate. This feature we could never observe in our specimens of *E. collematis*, where the cells of the ascospores are more or less of equal size and shape, eventually the lower one slightly narrower or more attenuated. Often the lower cells are even shorter than the upper ones.

Endococcus peltax Nyl., also described from the genus *Peltula* [(*Peltula obscurans* (Nyl.) Gyeln.)], is considered to be a synonym of *E. pseudocarpus* by most authors and the only difference given by Nylander (1873), the coloration of the peridial wall, is depending on the age of the perithecia and has no diagnostic value. Anyway, also in this taxon the ascospores are broader than in *E. collematis*, 5–6 µm. Another taxon probably belonging to *E. pseudocarpus* s. lat. is *Tichothecium latzelii* Keissl., described by Keissler (1909: 277) on *Enchylium tenax* (as *Collema pulposum*). Also in this taxon the ascospores are broader than in *E. collematis*, 12–15 × 6 µm. Here might belong a specimen reported as *E. pseudocarpus* on *Collema* sp. from Turkey by Halici & al. (2007) with ascospores of 13–15 × 5.5–6 µm.



Fig. 4. *Endococcus collematis*, holotype. Two perithecia immersed in the host thallus, causing gall-like swellings. Bar = 200 μ m.

The new species also has to be compared with *E. caudisporus* J.C. David & Etayo, described in David & Etayo (1995: 314) on *Lathagrium auriforme*. With $13\text{--}21 \times (3.5\text{--})4\text{--}5.5 \mu\text{m}$ the ascospores of this species are of similar size as in *E. collematis*, but they differ clearly in the lower cell markedly narrower and up to twice as long than the upper cell.

Additional specimens examined: **Italy**, Campania, Prov. di Salerno, Cilento, between Perito and Orria, $40^{\circ}18'43,4''\text{N}$, $15^{\circ}10'44,9''\text{E}$, 600 m, olive grove with oaks, on *Quercus pubescens*, on *Collema nigrescens*, 19.08.2016, W. & G. v. Brackel (hb Brackel 8583) (loc. 488a in this paper). – Abruzzo, Prov. di Chieti, Parco Nazionale della Majella, Valle Cannella W Fara S. Martino, Gole di S. Martino, $42^{\circ}05'04,4''\text{N}$, $14^{\circ}10'18,3''\text{E}$, 880 m, on slightly shaded limestone rocks, on *Lathagrium auriforme*, 16.8.2011, W. & G. v. Brackel (hb Brackel 6544) (loc 101 in Brackel 2015, reported under *E. pseudocarpus* with the remark: “*E. pseudocarpus* seems to be heterogeneous, at least one taxon with broad ascospores (5–7 μm) and one with narrow ascospores (3.5–5 μm) could be distinguished”).

– **Switzerland:** Kanton Bern, Meiringen, Schwarzwaldalp, $46^{\circ}40'05''\text{N}$, $08^{\circ}07'08''\text{E}$, 1630 m, on rock, on *Collema* sp., 25.8.2006, W. v. Brackel (hb Brackel 6603) (reported in Brackel 2013 under *E. pseudocarpus*).

– **Germany:** (all reported in Brackel 2014 under *E. pseudocarpus*): Oberpfalz, Kreis Neumarkt, Schlossberg Lutzmannstein, 550 m, on dolomitic rocks, on *L. auriforme*, 8.03.1996, W. v. Brackel (hb Brackel 2501).

– Schwaben: Kreis Oberallgäu, Fellhorn area, between Kanzelwand and Warmatsgund, $47^{\circ}19'48,4''\text{N}$, $10^{\circ}12'49,3''\text{E}$, 1755 m, on limestone rocks, on *Lathagrium undulatum*, 28.08.2011, W. v. Brackel (hb Brackel 5898). – Oberbayern: Kreis Berchtesgadener

Land, Nationalpark Berchtesgaden, between Kühroint-Alm and Watzmannhaus, 47°34'11"N, 12°56'31"E, 1575 m, limestone rocks, on *Enchylium tenax*, 2.10.2010, W. v. Brackel (hb Brackel 5395).

The measurements of the ascospores of the particular collections are:

2501: (12.0–)12.9–14.8(–15.5) × (3.5–)3.6–4.3(–4.5) μm, l/b = (2.9–)3.1–3–9(–4.3) (n = 20).

5395: (11.0–)11.7–13.5(–14.5) × (3.5–)3.6–4.2(–4.5) μm, l/b = (2.6–)2.9–3.6(–4.0) (n = 20).

5898: (9.5–)10.3–12.0(–12.5) × (3.5–)3.7–4.2(–4.5) μm, l/b = (2.4–)2.5–3.1(–3.4) (n = 20).

6543: (11.0–)12.0–14.9(–17.0) × (3.0–)3.2–4.0 μm, l/b = (2.8–)3.3–4.3(–5.0) (n = 40).

6603: (13.0–)14.2–16.4(–17.0) × (4.0–)4.4–5.1 (–5.0) μm, l/b = (2.8–)2.9–3.6(–4.0) (n = 20).

7370: (11.0–)11.9–14.4(–15.0) × (3.5–)4.1–4.9(–5.0) μm, l/b = (2.2–)2.5–3.4(–4.1) (n = 40).

8583: (8.0–)9.3–11.1(–12.0) × 3.5–4.4(–5.0) μm. l/b = (2.0–)2.3–2.9(–3.4) (n = 30).

****Endococcus ramalinarius*** (Linds.) D. Hawksw.

497a: on *Ramalina farinacea*, thallus (hb Brackel 8288).

This very rare species, confined to *Ramalina*, is known from a few countries in Europe as well as from New Zealand (Lindsay 1866, Khodosovtsev & al. 2007, van den Boom & Giralt 2012). In Italy it was known until now only from Calabria and Sicilia.

****Epicladonia sandstedei*** (Zopf) D. Hawksw.

476: on *Cladonia rangiformis*, podetia (hb Brackel 8296); **477:** on *C. pocillum*, basal squamules (hb Brackel 8300).

Conidiomata immersed, wall brown, inducing distinct galls; conidia (0–)1-septate, truncate at the base, rounded apically, hyaline, sometimes brownish at maturity, c. 9–13 × 2.5–3 μm. This is a widely distributed species growing on *Cladonia*. In Italy it was known until now from Calabria, Toscana and Trentino-Alto Adige.

****Epicladonia stenospora*** (Harm.) D. Hawksw. s. lat. (Fig. 5)

477: on *Cladonia convoluta*, squamules (hb Brackel 8402).

Conidiomata superficial, subglobose to urceolate, wall brown, c. 150–220 μm diameter, inducing swellings of the host thallus; conidia 0(–1)-septate, subcylindrical to bacilliform, truncate at the base, rounded apically, hyaline, 0(–1)-septate, (9.0–)9.8–11.0(–12.0) × (2.5–)2.8–3.3(–3.5) μm, l/b = (2.7–)3.1–3.7(–4.4) (n = 40).

According to Sérusiaux & al. (2003) and Zhurbenko & Pino-Bodas (2017) *Epicladonia stenospora* might be heterogenous mainly due to different shapes of the conidia. The main features distinguishing it from *E. sandstedei* are the septation of the conidia and the induction of galls. Both features are somehow diffuse, as for instance in the specimen from Campania we saw several conidia with very indistinct septa and the infection did not cause galls but sometimes slightly convex swellings on the host thallus.

SEpicoccum nigrum*** Link

507: on *Peltigera collina*, lower side of the thallus (hb Brackel 8568).

This saprophytic hyphomycete grows on different phanerogams, facultatively also lichenicolous, mostly on *Peltigera* species. With a lichenicolous habit the species is known in Italy only from Marche (Brackel 2015).



Fig. 5. *Epicladonia stenospora* on *Cladonia convoluta*, Campania. Bar = 0.5 mm.

*****Feltgeniomyces luxemburgensis*** Diederich (Fig. 6)

480: on *Lecidella elaeochroma*, thallus (hb Brackel 8586).

Feltgeniomyces luxemburgensis was found forming very small black sporodochia (40–60 µm diameter) on the thallus of *Lecidella elaeochroma*. The partly branched conidiophores emerge from a greyish brown mycelium. The terminal conidiogenous cells are also greyish brown, shortly cylindrical to ampulliform, with a darker collarette, 5–10 × 3.5–4.5 µm. The conidia are pale to dark greyish brown, non-septate, smooth, truncate, irregularly ellipsoid, (5.5–)6.3–7.8(–8.0) × (4.0–)4.3–5.2(–6.0) µm, l/b = (1.1–)1.3–1.7(–2.0) (n = 20).

This rarely collected species is known from Luxembourg (Diederich 1990), Norway (Frisch & al. 2020), Poland (Kukwa & Czarnota 2006, and others), always on species of *Lecidella*; it is also included in the list for New Zealand of de Lange & al. (2018) without further information. New to Italy and the Mediterranean.

****Heterocephalacria physciacearum*** (Diederich) Millanes & Wedin

479: on *Physcia adscendens*, thallus(hb Brackel 8571); **491:** on *P. adscendens*, thallus and rhizines.

This cosmopolitan species is common at least in Europe on different species of the family Physciaceae. In Italy, it is known from several regions, from the Alps to Calabria.

Intralichen baccisporus D. Hawksw. & M.S. Cole s. lat.

Puntillo & Brackel (2017) reported the species from Ischitella on *Caloplaca* sp. This species was described on *Xanthomendoza trachyphylla*, also a member of the family Teloschistaceae.

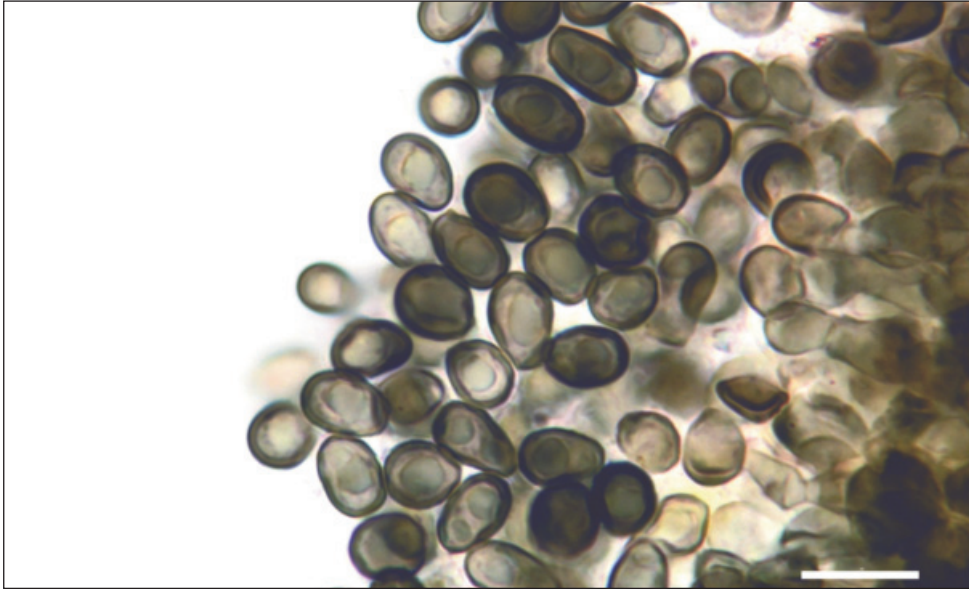


Fig. 6. *Feltgeniomyces luxemburgensis*, conidia and conidiogenous cells (right margin). Bar = 10 μm .

As the degree of host specificity in the genus *Intralichen* is not yet clear, we avoid to use the name in the strict sense for a specimen growing on another genus than the type.

Karschia talcophila (Ach. ex Flot.) Körb.

Jatta (1892: 209) reported this species as *Abrothallus talchophylus* Ach. from Ischia.

Kiliasia episema (Nyl.) Hafellner

Syn.: *Toninia episema* (Nyl.) Timdal

Nimis & Martellos (2020) list some citations of the species from Campania.

**Laeviomyces pertusariicola* (Nyl.) D. Hawksw.

Syn.: *Lichenodiplis pertusariicola* (Nyl.) Diederich

507b: on *Pertusaria pertusa*, thallus and ascomatal warts (hb Brackel 8603).

Conidiomata first immersed in the host thallus, later erumpent, black, in groups up to 200 μm diameter; conidiogenous cells lining the inner wall of the cavity, c. $4\text{--}6 \times 2 \mu\text{m}$, subhyaline to slightly brownish, partly annellidic; conidia ellipsoid with a distinctly truncate base, pale to medium brown, non-septate, smooth, $(2.5\text{--})3.1\text{--}4.2(\text{--}4.5) \times (2.0\text{--})2.2\text{--}2.8(\text{--}3.0) \mu\text{m}$, $l/b = (0.8\text{--})1.2\text{--}1.8(\text{--}2.0)$ ($n = 20$).

This is a widespread but not common species growing on members of the Pertusariaceae (Hawksworth 1981, Hafellner & Mayrhofer 2007, Zhurbenko & Otte 2012). In Italy it is known also from Basilicata and Sardegna.

Lambinonia strigulae (Elenkin & Woron.) Sérus. & Diederich

Sérusiaux & Diederich (2005) reported the species from Prov. di Salerno, Morigerati, Grotta del Bussento, on leaves of *Buxus sempervirens*, on *Strigula buxi*, 1997, D. Puntillo (CLU, LG).

**Lichenocodium erodens* M.S. Christ. & D. Hawksw.

All on the thallus: **468**: on *Evernia prunastri*, on *Pleurosticta acetabulum*; **475**: on *Parmelia sulcata*; **485**: on *Parmelina quercina*; **487**: on *Flavoparmelia caperata*; **490a**: on *Ramalina fastigiata*, on *Parmotrema perlatum*; **491**: on *F. caperata*; **494**: on *R. farinacea*; **495**: on *Physcia aipolia*; **496a**: on *R. fastigiata* (hb Brackel 8286, in the specimen of *Abrothallus suecicus*), on *E. prunastri*, on *P. sulcata*, on *Physconia servitii*; **497a**: on *E. prunastri*; **500**: on *P. sulcata*; **507**: on *Parmelia saxatilis*, on *F. caperata*, on *Punctelia subrudecta*; **508**: on *F. caperata*.

Lichenocodium erodens is one of the most common lichenicolous fungi with a worldwide distribution, mainly growing on foliose and fruticose lichens and causing severe damage on the host. In Italy it is known from 17 of the 20 regions, only missing in the up to now scarcely studied regions Piemonte, Val d'Aosta and Veneto.

**Lichenocodium lecanorae* (Jaap) D. Hawksw.

495: on *Lecanora carpinea*, apothecial disc (hb Brackel 8587).

Conidiomata pycnidial, half immersed in the apothecial disc of the host, black, ostiolate; conidiogenous cells lining the inner wall of the cavity, hyaline, ampulliform, $4-7 \times 2.5-3.5 \mu\text{m}$; conidia globose or slightly ellipsoidal, dark brown, delicately warted, c. $3-3.5 \mu\text{m}$ diameter. Also this species is widely distributed and often recorded, in Italy known from one half of the regions. It affects mainly members of the Lecanoraceae and Parmeliaceae; strangely in the former it prefers the apothecia and in the latter the thallus. Possibly the species comprises more than one taxon.

**Lichenocodium pyxidatae* (Oudem.) Petr. & Syd.

476: on *Cladonia rangiformis*, podetia (hb Brackel 8296, in the specimen of *Epicladonia sandstedei*).

This species grows mainly on members of the genus *Cladonia*. It is widespread over the northern hemisphere. In Italy it is known from a few regions.

**Lichenocodium usneae* (Anzi) D. Hawksw.

496a: on *Physcia aipolia*, thallus and apothecial margin (hb Brackel 8576).

This is an almost cosmopolitan species, growing on a multitude of foliose, fruticose and crustose lichens. In Italy it is known from most of the regions.

Lichenodiplis lecanorae (Vouaux) Dyko & D. Hawksw.

479: on *Lecanora* cf. *carpinea*, apothecia.

Lichenodiplis lecanorae was already reported for Campania by Puntillo & Brackel (2017) from Ischitella on *Caloplaca* sp. It is an almost cosmopolitan species, growing mainly in the apothecia of a multitude of crustose and foliose lichens. In Italy it is known from several regions.

****Lichenopeltella ramalinae*** Etayo & Diederich

All on *Ramalina farinacea*, thallus: **485** (hb Brackel 8283); **496a** (hb Brackel 8287); **497a** (hb Brackel 8289).

In the specimens 8287 and 8289 only a few catathecia were found intermixed with conidiomata of *Spirographa giselae* on blackened areas of the thallus of *Ramalina farinacea*. The species is widespread but rarely collected, growing on the thalli of *Ramalina* species. In Italy it is known from Veneto, Lazio, Molise, Calabria, Sardegna and Sicilia.

****Lichenostigma alpinum*** (R. Sant., Alstrup & D. Hawksw.) Ertz & Diederich

Syn.: *Phaeosporobolus alpinus* R. Sant.

468: on *Lepra albescens*, thallus (hb Brackel 8591, in the specimen of *Sclerococcum parasiticum*); **507a**: on *L. albescens*, thallus and soralia.

This species is a parasymbiont on members of the Pertusariaceae and probably of the Lecanoraceae. As only the *Phaeosporobolus* anamorph is known (and these anamorphs are poor in diagnostic features) several records of the species on other hosts are dubious.

L. alpinum seems to be cosmopolitan; in Italy it is known from half of the regions.

****Lichenostigma cosmopolites*** Hafellner & Calat.

504: on *Xanthoparmelia conspersa*, thallus (hb Brackel 8552).

Conformably with its name this species is worldwide distributed, growing always on members of the genus *Xanthoparmelia*. In Italy it is known from Trentino-Alto Adige, Lombardia, Toscana, Calabria and the two main islands.

****Lichenostigma elongatum*** Nav.-Ros. & Hafellner

477: on *Circinaria calcarea* and *Lobothallia radiosa*, thallus (hb Brackel 8271).

This widespread species grows on hosts of the genus *Aspicilia* s. lat., mainly on the thallus. In Italy it is known from most of the regions, from the Alps to Sicilia.

****Marchandiomyces corallinus*** (Roberge) Diederich & D. Hawksw.

485: on *Parmelina quercina*, *Flavoparmelia caperata*, thallus (hb Brackel 8543);

490a: on *Pertusaria pertusa*, thallus; **507**: on *P. quercina* and *P. pastillifera*, thallus.

This is an aggressive parasite on a multitude of foliose, fruticose and crustose lichens, easily recognizable due to the translucent pinkish colour of the irregular bulbils. It is widespread over the northern hemisphere and in Italy known from most of the regions.

*****Microsphaeropsis lichenicola*** Etayo agg.

479: on *Physcia adscendens*, thallus (hb Brackel 8572).

In the poor specimen we found black, globose conidiomata of c. 110 µm diameter, half immersed in the thallus of the host. Conidiogenous cells could not be observed, the pale brown, smooth, non-septate, ellipsoid to ovoid conidia measured (7.0–)7.1–8.6(–10.0) × (4.5–)4.6–5.0 µm, l/b = 1.5–1.7(–2.0) (n = 20).

Microsphaeropsis physciae Brackel, known from different species of *Physcia*, is similar but has much smaller conidia, (3–)3.4–4.5(–5) × (2.5–)2.7–34.(–4) µm. *Microsphaeropsis lichenicola* Etayo is known from different host genera (*Heterodermia*, *Hypotrachyna*, *Nephroma*, *Pannaria*) and has conidia of similar size to our specimen, (5.5–)6–7(–8) × (3.5–)4–5(–5.5) µm

in the protologue and $5\text{--}7 \times 3\text{--}3.5 \mu\text{m}$ on *Heterodermia* (Etayo & Sancho 2008, Etayo 2010a). Possibly more than one taxon is involved in the circumscription sensu Etayo as several not closely related host genera are involved and the measurements of the conidia cover a relatively wide range. Therefore, we prefer to ascribe our specimen to *M. lichenicola* Etayo agg., known until now only from South America (Chile, Peru; Etayo loc. cit.).

Minutoexcipula mariana V. Atienza

Puntillo & Brackel (2017) reported the species from Ischitella on corticolous *Pertusaria* sp.

Muellerella hospitans Stizenb.

Puntillo & Brackel (2017) reported the species from Ischitella on *Bacidina* aff. *assulata*.

Muellerella lichenicola (Sommerf. ex Fr.) D. Hawksw.

Puntillo & Brackel (2017) reported the species from Ischitella on *Caloplaca* sp. and *Xanthoria parietina*.

Muellerella pygmaea (Körber) D. Hawksw. s. l.

Jatta (1892: 210) reported the species as *Microthelia pygmaea* Körb. from Ischia.

Neocoleroa lichenicola subsp. *bouteillei* (Bricaud, Sérus. & Cl. Roux) M.E. Barr

Puntillo & al. (2000) reported the species from the Bussento canyon in the Cilento, growing on *Fellhanera bouteillei*.

****Opegrapha phaeophysciae*** R. Sant., Diederich, Ertz & Christnach

505: on *Hyperphyscia adglutinata*, thallus (hb Brackel 8565).

The species usually grows on hosts of the genus *Phaeophyscia*, but in Italy it is known also from *Hyperphyscia* (Brackel 2015). It is widespread over the northern hemisphere (Russia, Japan, Korea, USA) but very rarely reported (Ertz et al. 2005, Hafellner 2009, Frisch & Ohmura 2013, Kondratyuk et al. 2013), in Italy it was known until now only from Lazio and Toscana.

Opegrapha rupestris Pers.

Jatta (1889: 182; 1892: 210) reported the species as *Opegrapha saxatilis* DC. from Ischia, Nimis & Tretiach (2004) from the Valle del Bussento between Vibonati and Sicili, from the Monte Cerreto at the Costa Amalfitana and from Punta Campanella on the Penisola Sorrentina. All records do not mention a lichenicolous habit. *Opegrapha rupestris* is restricted to calcicolous crusts of the genera *Verrucaria* and *Bagliettoa*.

?*Paralecanographa grumulosa* (Dufour) Ertz & Tehler

Jatta (1875: 229) reported this species as "*Lecanactis epipolia* var. *monstruosa* Bagl. Mss." from Gragnano near Napoli, Nimis & Tretiach (2004) from Positano at the Amalfi Coast and from Punta Campanella on the Sorrento Penisola; this record was repeated by Garofalo & al. (2010). All these records are without the mention of a lichenicolous habit. The biological status of the species is dubious: it starts as a lichenicolous fungus but later probably develops an own thallus.

Phacothecium varium (Tul.) Trevis.

479: on *Xanthoria parietina*, thallus (hb Brackel 8559); **501:** on *X. parietina*, thallus.

Jatta (1889: 173; 1892: 210) noted the species as *Celidium varium* (Tul.) Mass. from Ischia on *X. parietina*, Jatta (1909-1911: 761) as *Arthonia varia* (Tul.) Jatta; Puntillo & Brackel (2017) reported it from Ischitella on *X. parietina*.

Phacothecium varium grows parasymbiotic on species of *Xanthoria* s. str. (*X. aureola*, *X. calcicola*, *X. parietina*). It is widely spread over the northern hemisphere from the Mediterranean to the boreal zone with a slight preference for the former. In Italy it is known from several regions from Sicilia to the northern Apennines.

Plectocarpon lichenum (Sommerf.) D. Hawksw.

490a: on *Lobaria pulmonaria*, thallus (hb Brackel 8569).

Jatta (1882: 137; 1889: 172; 1892: 209) reported the species as *Celidium stictarum* Tul. from Vesuvio, Avellino and from Ischia; Trotter & Romano (1912: 465) cite Jatta (1889): *Arthonia stictarum* (Tul.) Jatta on *Lobaria pulmonaria* from Avellino.

Plectocarpon lichenum is an almost worldwide distributed parasymbiont on species of the Lobariaceae. In Italy it is known from half of the regions and threatened due to the decline of the habitat of its main host, *Lobaria pulmonaria* (Nascimbene et al. 2013).

Pronectria oligospora* var. *octospora Etayo

483: on *Punctelia subrudecta*, thallus (hb Brackel 8542); **487:** on *P. subrudecta*, thallus (hb Brackel 8548).

This variety, growing on hosts of the genus *Punctelia*, is known from various countries in Europe and from China; in Italy we found it until now in Toscana, Lazio and Calabria.

Pronectria pertusariicola Lowen (Fig. 7)

480: on *Pertusaria pertusa* (hb Brackel 8593); **494:** on *Pertusaria hymeneae*, apothecial margin (hb Brackel 8595); **507b:** on *P. pertusa*, ascomatal warts.

This is a species with an Euro-Macaronesian distribution, restricted to hosts of the genus *Pertusaria*. In Italy it is known from several regions, mainly in the south.

In specimen 8593 we could observe the putative *Acremonium*-anamorph of *Pronectria pertusariicola*: Colonies confluent, superficial, whitish, building sporodochial-like cushions c. 200 µm diameter; mycelium mostly immersed, hyphae flexuose, thin-walled, smooth, hyaline, c. 2–3.5 µm wide; conidiophores semi-macronematous, unbranched, septate, hyaline, verruculose in the lower half, 35–50 µm long, 2.5–4.5 µm wide at the base and 1.5 µm at the apex; conidiogenous cells terminal, hyaline, thin-walled, smooth (eventually with some verruculae at the base), subulate, phialidic; conidia hyaline, non-septate, smooth, guttulate, basally truncate, apically rounded, (4.5–)5.0–6.9(–8.8) × (2.5–)2.8–3.1(–3.5) µm, l/b = (1.5–)1.7–2.3(–2.7) (n = 20). These features, especially the unbranched and verruculose conidiophores, distinguish it from *Acremonium pertusariae* Brackel & Etayo (Brackel & al. 2012), growing also on *Pertusaria*.

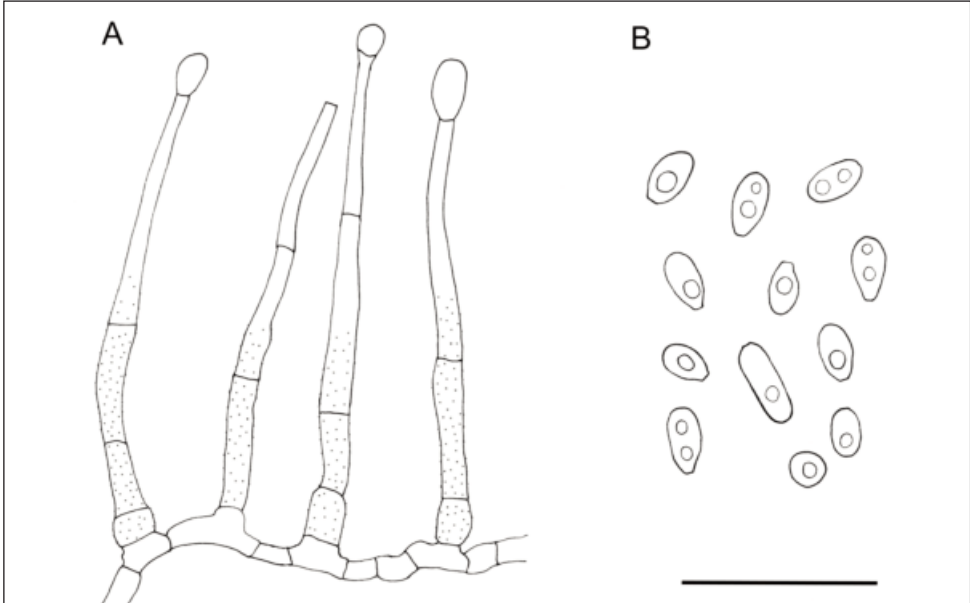


Fig. 7. putative *Acremonium*-anamorph of *Pronectria pertusariae*, Campania, Monti del Matese. Scale bar = 20 μm .

****Pseudocercospora lichenum*** (Keissl.) D. Hawksw.

485: on *Ramalina fastigiata*, thallus and apothecial discs (hb Brackel 8282).

This hyphomycete colonises several not related hosts, presumably as a saprophyte on pre-damaged thalli and apothecia. Nevertheless it seems to be obligately lichenicolous. In Italy it was known until now only from Umbria and Sicilia.

Pyrenochaeta xanthoriae Diederich

505: on *Xanthoria parietina*, apothecia (hb Brackel 8562).

Puntillo & Brackel (2017) reported this species already from Campania: Ischitella on *X. parietina*. Restricted to hosts of the genus *Xanthoria* it has an Eurasian distribution and is known in Italy also from Veneto, Basilicata, Puglia, Calabria, Sardegna and Sicilia.

****Reconditella physconiarum*** Hafellner & Matzer

480: on *Physconia* sp. (hb Brackel 8592).

Shiny, black, pyriform perithecioid ascomata, covered with numerous brown, septate, free hyphae on the margin, lower side and even rhizines of the host lichen, c. 200 μm diameter; hamathecial elements c. 2.5 μm wide, scarcely ramified and anastomosing; asci c. 80 \times 12 μm , 8-spored; ascospores pale to medium brown, ellipsoid, delicately warted, mostly non-septate but some with a non-median septum or even (once seen) with three septa, 17–21 \times 7–11 μm .

Reconditella physconiarum, restricted to hosts of the genus *Physconia*, is widespread over the northern hemisphere but rarely recorded. This is the second record for Italy after that from Calabria (Brackel & Puntillo 2016).

Sclerococcum microsporum (Etayo) Ertz & Diederich

Syn.: *Dactylospora microspora* Etayo

Tretiach (2004) and Nimis & Tretiach (2004) reported the species from the Baracche Forestali/Observatory in the Vesuvio National Park on a sterile crustose thallus; up to now this is the only Italian record. The species was described on *Catinaria atropurpurea* but is known also from other host lichens.

**Sclerococcum parasiticum* (Flörke ex Spreng.) Ertz & Diederich

Syn.: *Dactylospora parasitica* (Flörke ex Spreng.) Zopf

468: on *Lepra albescens*, thallus (hb Brackel 8591, teleomorph); **506:** on *Pertusaria* sp., thallus (hb Brackel 8598, teleomorph).

This is a widespread species with many mainly Eurasian records, restricted to hosts of the genera *Pertusaria* s. lat. and *Ochrolechia*; in Italy it is known from many regions from the Alps to Sicilia.

Sclerococcum saxatile (Schaer.) Ertz & Diederich

Syn.: *Buellia saxatilis* (Schaer.) Körb., *Dactylospora saxatilis* (Schaer.) Hafellner

Jatta (1892: 209) noted the species as *Buellia saxatilis* Schaer. from the Arso volcano on Ischia; probably this record refers to a specimen deposited in M, collected by A. Jatta in Ischia and labelled with *Buellia saxatilis* Krb. (“ad rupes in insula Inarime”).

Skyttea heterochroae Nav.-Ros. & Muniz

Puntillo & Brackel (2017) reported this species from Ischitella on *Pertusaria heterochroa*.

Sphaerellothecium parietinarium (Linds.) Hafellner & V. John

Puntillo & Brackel (2017) reported this species from Ischitella on *Xanthoria parietina*.

Sphinctrina leucopoda Nyl.

Garofalo & al. (2010) reported the species from Monte Faito, Penisola Sorrentina (“mainly on *Pertusaria pertusa* on the bark of *Castanea sativa* in humid areas”). Nimis & Tretiach (2004) reported it from the Valle del Bussento between Vibonati an Sicili without mentioning a host. Puntillo & Puntillo (2009) list an own find for the region without further information.

Sphinctrina tubiformis A. Massal.

Terracciano (1872) reported the species under *S. tubaeformis* Massal. from Carditello/San Tammaro and in the Bosco di S. Leucio, both near Caserta, on *Pertusaria wulfenii* (= *Pertusaria hymenea*). Ricciardi & al. (2000) reported *Sphinctrina tubiformis* Massal. var. *epielachista* Bagl. et Car., citing Licopoli (1873): “rariissima su lave recenti alla Cerrola, meno rara su quelle die Calastro e dei cappuccino della Torre.” [Vesuvio].

Sphinctrina turbinata (Pers.) De Not. (Fig. 8)

468: on *Pertusaria pertusa* (hb Brackel 8590).

Jatta (1889: 193; 1892: 210; 1909-1911: 118) reported the species under the current name on *Pertusaria communis* DC. (= *P. pertusa*) from Astroni (Campi Flegrei near Napoli) and from Ischia. Recent records were reported by Aprile & al. (2003) from several sites in the Monti del Matese (“Parassita sulle varie specie del genere *Pertusaria*”) and Garofalo & al. (2010) from Monte Cerasuolo, Penisola Sorrentina (“parasitic on other lichens”).

This almost worldwide distributed species grows as a parasymbiont on hosts of the genus *Pertusaria*. In Italy it is known from almost all regions, also with several recent records, whereas in Central Europe most of the records date back to the 19th or early 20th century.

****Spirographa giselae*** (Brackel) Flakus, Etayo & Miadlikowska

496a: on *R. farinacea*, thallus (hb Brackel 8287, in the specimen of *Lichenopeltella ramalinae*); **497a:** on *R. farinacea*, thallus (hb Brackel 8289, in the specimen of *L. ramalinae*).

According to the results of molecular studies, Flakus & al. (2019) transferred *Asteroglobolus giselae* Brackel to *Spirographa* and they noted that it is a hyperparasite on *Lichenopeltella* cf. *ramalinae*. Actually, in our specimens 8277 and 8287 we could find *Lichenopeltella ramalinae* associated with *Spirographa giselae*. However, the relationship between them is not yet clear to us, as we could observe several conidiomata of *S. giselae* growing directly on the thallus of *R. farinacea* without any connection to a blackish area on the thallus or to catathecia of *L. ramalinae*.

The species, always growing on hosts of the genus *Ramalina*, is known from few records in Europe, the Canary Islands and Bolivia (Brackel 2016, Flakus & al. 2019, E. Zimmermann pers. comm.). In Italy it was found also in Molise, Basilicata and Sicilia.

****Spirographa intermedia*** (Punith. & D. Hawksw.) Flakus, Etayo & Miadlikowska agg.

481b: on *Romularia lurida*, thallus (hb Brackel 8558, in the specimen of *Polycoccum* sp.); **502b:** on *Rinodina sophodes*, apothecia (hb Brackel 8433).

Flakus & al. (2019) showed that *Cornutispora* s. lat. is the anamorphic state of the genus *Spirographa* and that the species of the genus are highly host-specific mainly on the generic level. In this perspective, the attribution of species of “*Cornutispora*” to several host genera seems to be wrong, resulting from the poorness of features of the anamorphic state. Under *S. intermedia* agg. we report the records of *Cornutispora*-anamorphs similar to what Punithalingam (2003) described as *Cornutispora intermedia*, well aware that there are several hidden, partly undescribed species. *S. intermedia* s. str. should be used only for material on the host genus of the type, *Ochrolechia*.

Stigmidium congestum (Körb.) Triebel

Jatta (1880: 242) reported the species as *Pharcidia congesta* on the apothecia of *Lecanora subfusca* from Monti Picentini (“monte Celica” = Monte Accellica).

****Stigmidium lecidellae*** Triebel, Roux & Le Coeur

Both on *Lecidella elaeochroma*, apothecial disc: **480** (hb Brackel 8586, in the specimen of *Feltgeniomyces luxemburgensis*); **495** (hb Brackel 8582).

This species is known up to now only from a few European countries, always on the

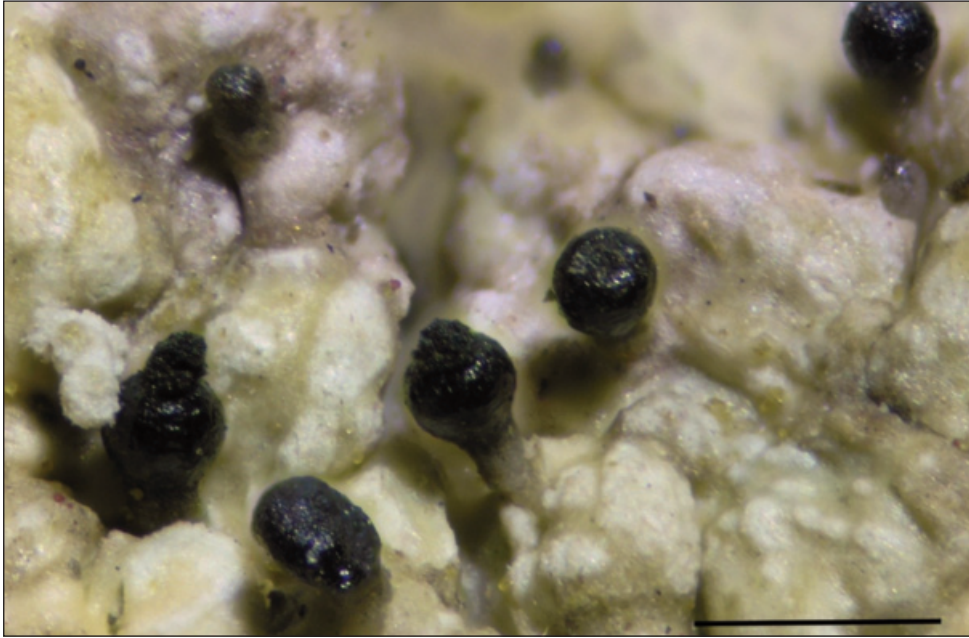


Fig. 8. *Sphinctrina turbinata* on *Pertusaria pertusa*, Campania, Bosco di Decorata, 2016. Scale bar = 0.5 mm.

apothecia of *Lecidella elaeochroma* (Roux et al. 1995 and others). In Italy it is known also from Lazio, Puglia and the two main islands.

**Stigmidium microspilum* (Körb.) D. Hawksw.

Both on *Graphis scripta*, thallus: **493**; **497b** (hb Brackel 8431).

Confined to the thallus of *Graphis scripta*, this species with an Eurasian distribution is known in Italy also from Veneto, Friuli-Venezia Giulia, Lazio, Toscana and Calabria.

¿*Stigmidium schaeferi* (A. Massal.) Trevis.?

Nimis & Tretiach (2004) reported the species from Capo Palinuro in the Prov. di Salerno without mentioning a host. *Stigmidium schaeferi* is restricted to *Dacampia hookeri*, a species missing in their list for the locality. Maybe the material refers to *Stigmidium congestum* (Körb.) Triebel (growing on different *Lecanora* species) for which the name *S. schaeferi* was used formerly.

**Taeniolella pertusariicola* D. Hawksw. & H. Mayrhofer

500: on *Pertusaria* sp., thallus (hb Brackel 8597).

This hyphomycete with a wide distribution in the northern hemisphere parasites on hosts of the genera *Pertusaria* s. lat. and *Ochrolechia*. In Italy it is known also from Lazio, Puglia and Calabria.

****Taeniolella phaeophysciae*** D. Hawksw.

480: on *Phaeophyscia orbicularis*, thallus (hb Brackel 8574; 8585 in the specimen of *Vouauxiella lichenicola*).

Growing on different hosts of the family Physciaceae, this hyphomycete is widely distributed over the northern hemisphere. In Italy it is known from several regions from the Alps to Calabria.

****Teloggalla olivieri*** (Vouaux) Nik. Hoffm. & Hafellner

All on the thallus of *Xanthoria parietina*: **478; 479** (hb Brackel 8559, in the specimen of *Phacothecium varium*); **499; 501; 505**. This is a parasymbiont on different species of the genus *Xanthoria* with an Eurasian distribution, known from several Italian regions.

Toninia plumbina (Anzi) Hafellner & Timdal (Fig. 9)

491: on *Pectenaria plumbea*, thallus (hb Brackel 8580).

Toninia plumbina is a non-lichenized parasite on *Pectenaria* (= *Degelia*) *plumbea* and other Pannariaceae. It was described by Anzi (1862: 29) from a record in the Valle del Mugnone near Firenze. It is known from several regions in Italy (mainly south of the Po plain around the Tyrrhenian Sea) and also from Campania (Timdal 1991, Nimis & Tretiach 2004, Nimis & Martellos 2020, Garofalo & al. 2010, Catalano & al. 2016). The species is widely distributed over the northern hemisphere (Timdal 1991 and others) and restricted to hosts of the genus *Pectenaria* and perhaps also other lichens with cyanobacterial photobionts.

****Unguiculariopsis lettaui*** (Grumann) Coppins

468: on *Evernia prunastri*, thallus (hb Brackel 8549).

This gall-inducing parasite of *Evernia prunastri* is widely distributed over the northern hemisphere (Diederich & Etayo 2000 and others). In Italy it is known also from Trentino-Alto Adige, Toscana, Lazio, Molise, Basilicata, Calabria and Sardegna.

****Vouauxiella lichenicola*** (Linds.) Petr. & Syd.

480: on *Lecanora carpinea*, apothecia (hb Brackel 8585); **506:** on *Lecanora chlarotera*, apothecia (hb Brackel 8588, in the specimen of *Catillaria nigroclavata* on *Hyperphyscia adglutinata*).

This is a worldwide distributed coelomycete growing in the apothecia of different *Lecanora* species, known from several Italian regions.

Vouauxiella verrucosa (Vouaux) Petr. & Syd.

Puntillo & Brackel (2017) reported this species from Ischitella on *Lecanora pulicaris*.

Xanthoriicola physciae (Kalchbr.) D. Hawksw.

All on the apothecia and partly on the thallus of *Xanthoria parietina*: **479:** (hb Brackel 8560, in the specimen of *Arthonia parietinaria*); **501; 505** (hb Brackel 8563); **519.**

This species was already known from Campania (Puntillo & Brackel 2017): Ischitella on *X. parietina*.

It is widely distributed and common at least in most parts of Europe. In Italy it is known from several regions, also from areas with a high nitrogen impact like the Po plain.

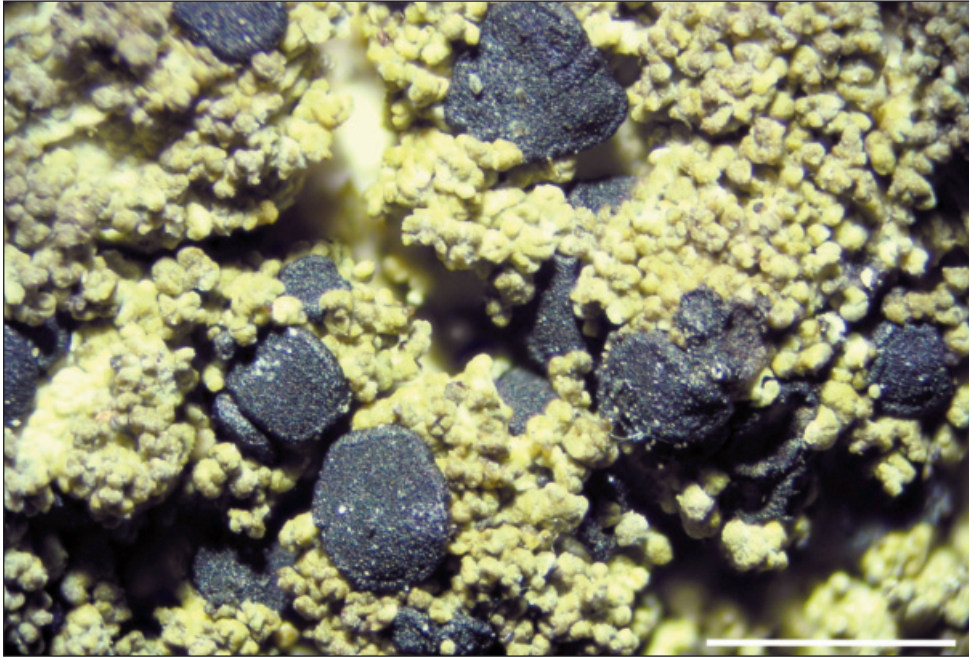


Fig. 9. *Toninia plumbina* on *Pectenium plumbeum*, Campania, Cilento 2016.

****Xenonectriella physciacearum*** F. Berger, E. Zimm. & Brackel

480: on *Physcia aipolia* and *Physconia distorta*, thallus (hb Brackel 8575); **495:** on *P. distorta*, thallus.

This only recently described species (Berger & al. 2020) is a parasite on several hosts of the family Physciaceae. It is known until now only from Europe (Germany, Austria, Switzerland, Italy). In Italy it was found in several regions south of the Po plain.

****Xenonectriella septemseptata*** (Etayo) Etayo & van den Boom

480: on *Melanohalea elegantula*, thallus (hb Brackel 8541); **495:** on *Melanelixia glabra*, apothecia and thallus (hb Brackel 8550).

This rarely collected species, growing on hosts of the genera *Melanelixia* and *Melanohalea*, is known until now only from a few European countries. In Italy we found it also in Toscana, Lazio, Molise, Puglia and Calabria.

****Xenonectriella subimperspicua*** (Speg.) Etayo

500: on *Parmelina quercina*, thallus (hb Brackel 8551).

This widespread but rather rare species is restricted to hosts of the family Parmeliaceae (*Hypotrachyna*, *Parmelia*, *Parmelina*, *Parmotrema*, *Punctelia*). In Italy it was known until now only from the Toscana on *Parmelia sulcata* and *Parmelina tiliacea* (Brackel 2015). Our record refers to the nominal variety and shows a weak reaction with KOH, some of the ascomata even missing a reaction.

Undescribed species

Some of the collections proved to represent yet undescribed species (“known unknowns”). Due to the poor material they cannot be described formally, but we estimate these interesting finds worth presenting.

Arthonia sp. (Fig. 10)

502: on *Pannaria conoplea*, thallus (hb Brackel 8581).

Ascomata arthonioid, black, convex, superficial, c. 400 µm diameter, single or in loose groups. **Hypothecium** reddish brown, hymenium subhyaline, epithecium blackish, all K–. **Paraphyses** septate, ramifying, anastomosing, apically dark granularly pigmented, imbedded in a gelatinous mass. **Asci** 4–8-spored, saccate, 35–40 × 15–17 µm, covered by a gelatinous sheath 1–2 µm thick. **Ascospores** long hyaline and smooth, then pale brownish and finely verruculose, soleiform, 1-septate, slightly constricted at the septum, K/I–, (10.0–)11.3–13.8(–16.0) × (5.0–)5.3–6.4(–7.5) µm. l/b = (1.7–)1.9–2.4(–2.6) (n = 40).

Up to now four species of *Arthonia* were described on members of the Pannariaceae (some records of other species of *Arthonia* on members of the family like *A. clemens*, *A. fuscopurpurea* and *A. pelvetii* result from using a wider concept of these taxa in former times): *A. epifarinoso* Etayo, *A. lepidiota* (H. Olivier) R. Sant., *A. sampaianae* (Diederich & Etayo) Ertz & Diederich an *A. pannariae* Zhurb. & Grube. *A. sampaianae* is clearly distinguished from our taxon by the 3-septate and much bigger ascospores (20–26 × 6–8 µm), whereas *A. lepidiota* has much smaller ascospores (6–9 × 3–4 µm). *A. pannariae* and *A. epifarinoso* have ascospores of a similar size as our taxon [(7.5–)9.5–12.5(–17) × (3–)3.5–4.5(–5) and 11.5–13 × 4–4.5 µm], but in both species they remain hyaline and smooth even when mature. From all other species of the genus *Arthonia* our taxon is distinguished by the host family.

Capronia lecanorae Brackel ad int. (Fig. 11)

475: on *Lecanora horiza*, thallus (hb Brackel 8608).

Vegetative hyphae pale brown, cylindrical to torulose, c. 2.5 µm wide, septate, originating from the base of ascomata. **Ascomata** perithecioid, black, subglobose, 90–135 µm diameter, ostiolate, with a dense corona of stiff setae around the ostiole. **Setae** dark brown, subulate, the tips blunt, 20–30 µm tall, 2.5–4.5 µm wide, base bulbous, 5–7 µm wide, thick-walled, non-septate, unbranched, straight to bent in diverse directions. **Exciple** medium brown, dark brown in the upper quarter, in surface view composed of angular pseudoparenchymatous cells (textura angularis) 2.5–7 µm across, K+ more greyish. **Hamathecium** not observed. **Asci** not observed, all ascospores were already released from the asci. **Ascospores** initially hyaline, then pale greyish brown, narrowly ellipsoid to fusiform, apically bluntly attenuated, transversely septate or submuriform, with (0–)3–4(–5) transverse septa and with longitudinal or oblique septa in 0–1(–2) cells, not constricted at the septa, smooth-walled, non-halonate, (11.0–)12.1–14.6(–15.0) × (3.5–)3.8–4.7(–5.0) µm, l/b = (2.5–)2.8–3.6(–3.9) (n = 20).

The genus *Capronia* comprises c. 20 lichenicolous species and about 70 saprophytic species (Friebes 2012). It is characterised by perithecioid ascomata with stiff dark setae around the ostiole, the absence of interascal filaments, fissitunicate asci and septate, often submuriform ascospores.

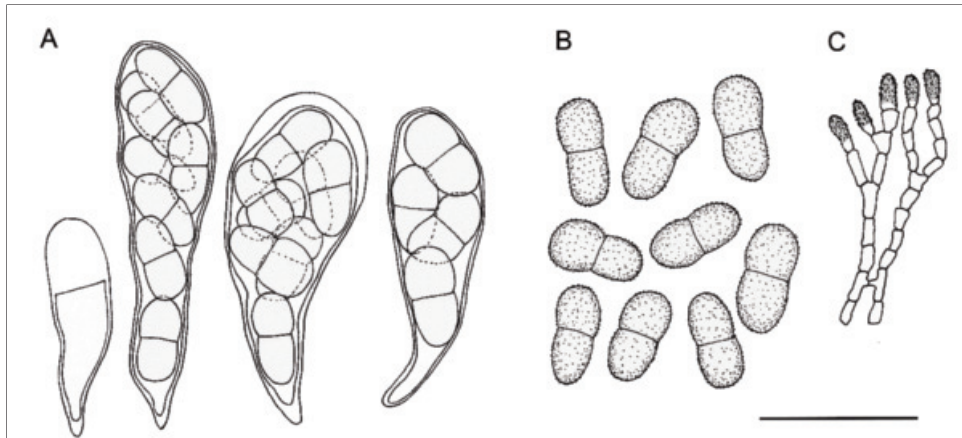


Fig. 10. *Arthonia* sp. on *Pannaria conoplea*. A: Asci. B: Ascospores. C: Paraphyses. Bar = 20 μm .

Among the lichenicolous species, *C. andina* Etayo, *C. magellanica* Etayo and *C. solitaria* Etayo have similar ascospore measurements. The first two are distinguished from our taxon by the (at least sometimes) septate setae, the latter by the very small ascomata (50–199 μm) and the few setae arranged in only one circle around the ostiole. To compare it with the non-lichenicolous species, the key of Friebes (2012) was used which led to *C. pulcherrima* (Munk) E. Müll., Petrini, P.J. Fisher, Samuels & Rossmann; this species differs from our taxon in the bigger ascomata (150–200 μm) and the poorer septation of the ascospores. Additionally, none of the described species of *Capronia* (except for the multi-spored *C. triseptata*) is known to grow on *Lecanora* or on members of the family Lecanoraceae.

Lichenopeltella lecanoricola Brackel ad int. (Fig. 12)

475: on *Lecanora horiza*, thallus (hb Brackel 8584).

Vegetative hyphae not seen. **Ascomata** catathecioid, single, \pm irregularly rounded in surface view, slightly convex, 80–100 μm diameter, c. 20–25 μm high, brown, not darker around the ostiole; the upper layer one cell thick, composed of radially arranged brown quadrangular cells, 3–5 \times 2–5 μm , K⁺ dark grey; forming no collar around the ostiole, lacking setae; ostiole c. 7 μm wide (in mature state, when wet); basal layer one cell thick, composed of radially arranged, pale brown, quadrangular cells, c. 3–5 μm wide; ascomatal margin entire, slightly sinuate. Paraphyses not observed. **Asci** 8-spored, ovoid to obclavate, 25–30 \times 10–11 μm . **Ascospores** 1-septate, ellipsoid, hyaline, without setulae, episporium smooth, 4-guttulate, pseudo-tetrablastic, both ends rounded, (8.5–)9.0–10.4(–11.0) \times (2.5–)2.7–3.3(–3.5) μm , l/b = (2.7–)2.9–3.6(–4.0) (n = 20).

Lichenopeltella comprises (besides c. 10 species saprophytic or parasitic on phanerogams) c. 40 obligately lichenicolous fungi, most of them specific to one host genus or even one host species. The genus is characterised by catathecioid ascomata with a basal plate and a flat-conical or scutellate upper part, both built of one cell layer.

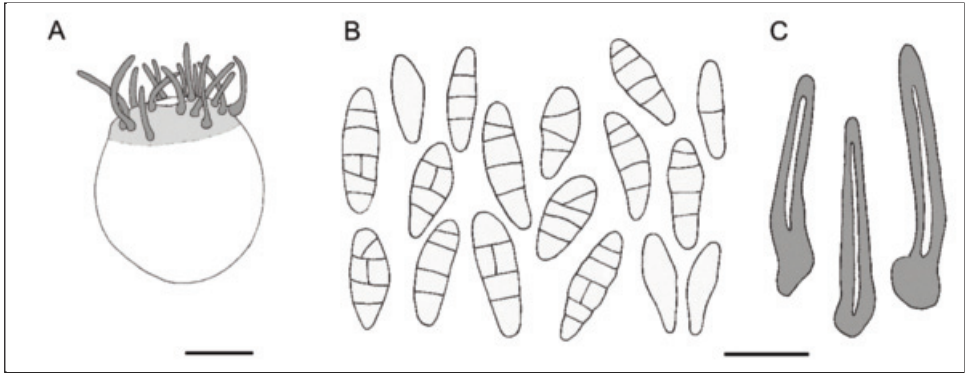


Fig. 11. *Capronia lecanorae* ad int. A: Perithecium in side view. B: Ascospores. C: Setae. Bar A = 50 μm , B, C = 10 μm .

Diagnostic are the presence or absence of a distinct collar around the ostiole, the presence or absence and orientation of dark, stiff setae around the ostiole and the presence or absence, location and number of filiform setulae on the ascospores.

Among the few lichenicolous species of the genus without setae as well as setulae and with 8-spored asci all except for *L. microspora* Diederich have bigger, at least longer ascospores. *L. microspora* has shorter ascospores, $7.5\text{--}9 \times 3\text{--}3.5 \mu\text{m}$ and lives on another host genus, *Parmeliella*. None of the described species of *Lichenopeltella* is known to grow on hosts of the genus *Lecanora* nor of the family Lecanoraceae.

***Polycoccum* sp.**

481b: on *Romjularia lurida*, thallus (hb Brackel 8558).

In our specimen we could observe only very old ascomata filled with mature ascospores released from the asci. They are 1-septate, dark brown, verrucose, constricted at the septum, $20\text{--}26 \times 6\text{--}7.5 \mu\text{m}$ with the lower cell narrower than the upper one.

The systematic position of the genus *Romjularia* is still unclear; usually it is positioned in the family Lecideaceae (e.g. Wijayawardene & al. 2020), but this is possibly is not correct (Miadlikowska & al. 2014, Fryday & al. 2014).

Nevertheless we compared our specimen with *Polycoccum* species growing on Lecideaceae (*P. amygdalariae* F. Berger & Triebel, *P. decolorans* Calat. & Triebel and *P. kernerii* J. Steiner) but all of them have shorter ascospores: *P. decolorans* with only slightly different ascospore dimensions induces bleached bullate areas on the host thallus, a feature not observed in our specimen. We compared it also with other *Polycoccum* species with similar ascospore dimensions but all of them showed at least one excluding feature: *P. psorae* Zhurb. & Triebel and *P. sporastatae* have olive-brown ascospores, *P. deformans* R. Sant. & Brackel and *P. perrugosae* Brackel induce galls on the host thallus, *P. squamaroides* (Mudd) Arnold and *P. longisporum* Etayo have smooth ascospores and *P. evae* Calat. & V.J. Rico and *P. tinatii* Diederich have broader ascospores.

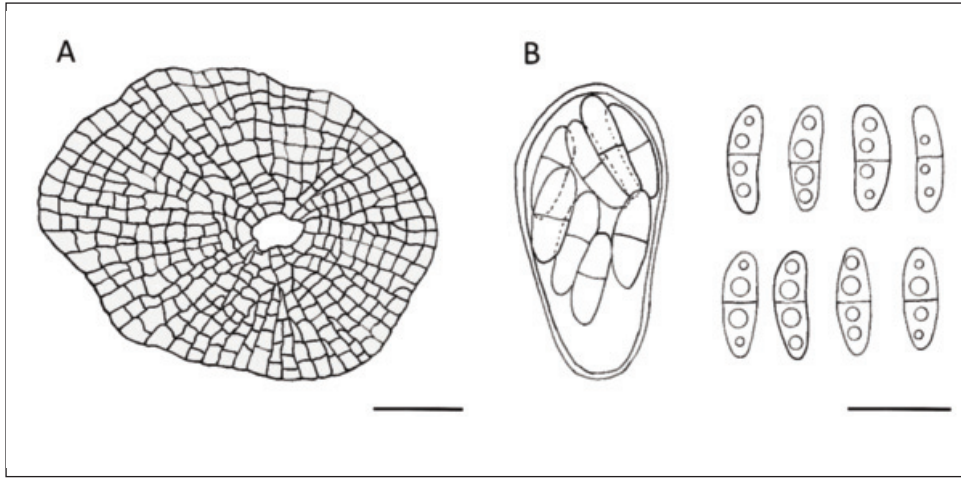


Fig. 12. *Lichenopeltella lecanoricola* ad int. A: Catathecium in surface view. B: Asci and ascospores. Bar A = 20 μ m, B = 10 μ m.

Stigmidium sp.

485b: on *Xanthoparmelia conspersa*, apothecial discs (hb Brackel 8544).

Ascomata perithecia, brown, up to 60 \times 80 μ m, immersed in the hymenium of the host, connected to each other by strands of torulose brown hyphae; these form a layer between the hypothecium and the hymenium, sending up into the hymenium secondary strands from which the ascomata arise. **Asci** 8-spored. **Ascospores** irregularly 2–3-seriate arranged in the asci, brown already when young, 1-septate, with cells of \pm equal size and shape, c. 10–12 \times 5 μ m. No *Stigmidium* (and no *Sphaerellothecium*) growing in the hymenium of *Xanthoparmelia* is known; *Stigmidium xanthoparmeliarum* Hafellner, restricted to the host thallus, has bigger ascospores (13–16 \times 4–5.5 μ m). Unusual is the early colouring of the ascospores.

Lichens searched for lichenicolous fungi

During the search for lichenicolous fungi we noted 120 taxa of lichens, two of which are new to Campania (according to ITALIC 6.0):

Physconia enteroxantha (Nyl.) Poelt: loc. 468 and

Scytinium teretiusculum (Wallr.) Otálora et al.: loc. 491 (hb Brackel 8377).

The complete lichen list is presented in the Table 1.

Table 1. The lichens taxa are listed in alphabetical order, followed by the number of the locality. Two species (*Physconia enteroxantha*, *Scytinium teretiusculum*) are new to Campania (according to ITALIC 6.0).

Taxa	Locality
<i>Alyxoria varia</i> (Pers.) Ertz & Tehler	493
<i>Anaptychia ciliaris</i> (L.) A. Massal.	468, 475, 480, 489, 495, 496, 507
<i>Arthonia radiata</i> (Pers.) Ach.	468, 493, 494, 495, 497, 502
<i>Bagliettoa marmorea</i> (Scop.) Gueidan & Cl. Roux	477
<i>Bagliettoa calciseda</i> (DC.) Gueidan & Cl. Roux	477
<i>Blastenia ferruginea</i> (Huds.) A. Massal. agg.	485a, 487, 489, 490, 495, 496, 500, 505, 506, 507
<i>Byssoloma leucoblepharum</i> (Nyl.) Vain.	498
<i>Calicium adpersum</i> Pers.	468
<i>Calicium salicinum</i> Pers.	468
<i>Caloplaca cerina</i> (Hedw.) Th. Fr.	479
<i>Candelaria concolor</i> (Dicks.) Stein	483, 490, 506
<i>Candelariella reflexa</i> (Nyl.) Lettau	506
<i>Candelariella vitellina</i> (Hoffm.) Müll. Arg	504, 509
<i>Candelariella xanthostigma</i> (Ach.) Lettau	475, 496
<i>Catillaria nigroclavata</i> (Nyl.) Schuler	491, 501, 502, 505
<i>Cetraria aculeata</i> (Schreb.) Fr.	476
<i>Chrysothrix candelaris</i> (L.) J.R. Laundon	468, 490
<i>Circinaria calcarea</i> (L.) A. Nordin & al.	477, 482, 492
<i>Cladonia chlorophaea</i> (Sommerf.) Spreng.	468, 507
<i>Cladonia coniocraea</i> (Flörke) Spreng.	490
<i>Cladonia fimbriata</i> (L.) Fr.	507c
<i>Cladonia foliacea</i> f. <i>convoluta</i> (Lam.) Nimis ad int.	476, 477, 496
<i>Cladonia macilenta</i> Hoffm.	507
<i>Cladonia pocillum</i> (Ach.) Grognot	476, 477, 492
<i>Cladonia rangiformis</i> Hoffm.	476, 477, 496, 507c, 509
<i>Cladonia symphyocarpia</i> (Flörke) Fr.	476, 477
<i>Collema nigrescens</i> (Huds.) DC.	483, 485, 486, 487, 488, 491, 494, 497, 500, 506
<i>Diploschistes muscorum</i> (Scop.) R. Sant.	477
<i>Diplotomma hedinii</i> (H. Magn.) P. Clerc & Cl. Roux	477
<i>Enchylium tenax</i> (Sw.) Gray	477
<i>Evernia prunastri</i> (L.) Ach.	468, 478, 485a, 487, 490, 494, 496, 497, 500, 506, 507
<i>Flavoparmelia caperata</i> (L.) Hale	468, 483, 485a, 487, 490, 491, 494, 496, 497, 498, 500, 505, 506, 507, 508
<i>Flavoparmelia soledians</i> (Nyl.) Hale	505

<i>Graphis scripta</i> (L.) Ach.	493, 497, 502
<i>Gyalolechia flavovirescens</i> (Wulfen) Söchting & al.	477
<i>Hyperphyscia adglutinata</i> (Flörke) H. Mayrhofer & Poelt	501, 505, 506, 508
<i>Hypogymnia physodes</i> (L.) Nyl.	468, 507
<i>Hypogymnia tubulosa</i> (Schaer.) Hav.	490, 496, 507
<i>Lathagrium auriforme</i> (With.) Otálora & al.	483, 492
<i>Lathagrium cristatum</i> (L.) Otálora & al.	477, 481b, 492, 496
<i>Lecanora allophana</i> (Ach.) Nyl. f. <i>allophana</i>	475, 487, 489, 491, 499
<i>Lecanora carpinea</i> (L.) Vain.	475, 479, 480, 489, 495, 496, 497
<i>Lecanora chlarotera</i> Nyl.	468, 475, 478, 479, 488, 489, 489, 490, 491, 495, 496, 497, 498, 499, 500, 501, 502, 506, 507
<i>Lecidea fuscoatra</i> (L.) Ach.	504
<i>Lecidella elaeochroma</i> (Ach.) M. Choisy	468, 475, 478, 479, 480, 483, 485a, 488, 489, 490, 491, 493, 494, 495, 496, 497, 498, 500, 501, 505, 506, 507, 508
<i>Lepra albescens</i> (Huds.) Hafellner	468, 475, 485a, 487, 490, 491, 496, 500, 506, 507
<i>Lepra amara</i> (Ach.) Hafellner	468, 485a, 487, 488, 490, 491, 494, 495, 500, 508
<i>Lepra slesvicensis</i> (Erichsen) Hafellner	490a (hb Brackel 8378)
<i>Leprocaulon quisquiliare</i> (Leers.) M. Choisy	504
<i>Lobaria pulmonaria</i> (L.) Hoffm.	486, 490a (hb Brackel 8569, in the specimen of <i>Plectocarpon lichenum</i>), 507
<i>Lobothallia radiosa</i> (Hoffm.) Hafellner	477, 496
<i>Melanelixia glabra</i> (Schaer.) O. Blanco & al.	480, 483, 485a, 490, 491, 495, 496, 500, 507
<i>Melanelixia glabratula</i> (Lamy) Sandler & Arup	468, 475, 480, 490, 495, 496, 497, 498, 507
<i>Melanelixia subaurifera</i> (Nyl.) O. Blanco & al.	479, 485a, 487, 491, 494, 495, 496
<i>Melanohalea elegantula</i> (Zahlbr.) O. Blanco & al.	468, 480, 507
<i>Melanohalea exasperata</i> (De Not.) O. Blanco & al.	488, 490, 495, 506, 507, 508
<i>Myriolecis crenulata</i> (Hook.) Sliwa & al.:	477
<i>Myriolecis dispersa</i> (Pers.) Sliwa & al.	477, 504
<i>Myriolecis hagenii</i> (Ach.) Sliwa & al.	499
<i>Nephroma laevigatum</i> Ach.	486, 490
<i>Normandina pulchella</i> (Borrer) Nyl.	481a, 483, 485a, 491, 497, 502, 506
<i>Ochrolechia pallescens</i> (L.) A. Massal.	490, 495, 496, 507

<i>Ochrolechia subviridis</i> (Høeg) Erichsen	506
<i>Pannaria conoplea</i> (Ach.) Bory	502, 506
<i>Parmelia saxatilis</i> (L.) Ach. agg.	468, 480, 490, 496, 507
<i>Parmelia sulcata</i> Taylor	468, 475, 479, 480, 485a, 487, 489, 490, 491, 494, 495, 496, 497, 498, 500, 507, 508
<i>Parmelina pastillifera</i> (Harm.) Hale	475, 480, 488, 495, 496, 507
<i>Parmelina quercina</i> (Willd.) Hale agg.	485a, 488, 489, 490, 495, 496, 497, 499, 502, 506, 507
<i>Parmelina tiliacea</i> (Hoffm.) Hale	468, 485a, 487, 488, 491, 494, 496, 500, 506, 507, 508
<i>Parmotrema perlatum</i> (Huds.) M. Choisy	481a, 483, 485a, 486, 487, 489, 490, 494, 497, 498, 500, 502, 506, 507, 508
<i>Pectenia plumbea</i> (Lightf.) P.M. Jørg. & al.	485a, 488, 491, 494, 508
<i>Peltigera collina</i> (Ach.) Schrad.	507(hb Brackel 8568, in the specimen of <i>Epicoccum nigrum</i>)
<i>Peltigera praetextata</i> (Sommerf.) Zopf	507c
<i>Pertusaria flavida</i> (DC.) J.R. Laundon	468, 490, 494, 500, 506, 507
<i>Pertusaria hymenea</i> (Ach.) Schaer.	485a, 488, 491, 494
<i>Pertusaria leioplaca</i> (Ach.) DC.	485a
<i>Pertusaria pertusa</i> (L.) Tuck.	468, 480, 485a, 489, 490, 491, 493, 498, 500, 502, 506, 507, 508
<i>Phaeophyscia orbicularis</i> (Neck.) Moberg	478, 480, 485a, 496, 499, 501
<i>Phlyctis agelaea</i> (Ach.) Flot.	493
<i>Phlyctis argena</i> (Spreng.) Flot.	468, 480, 483, 486, 487, 495, 497, 498, 500, 502
<i>Physcia adscendens</i> H. Olivier	468, 478, 479, 487, 491, 495, 496, 497, 501, 505, 506
<i>Physcia aipolia</i> (Humb.) Fürnr.	468, 475, 480, 485a, 488, 489, 490, 491, 494, 495, 496, 497, 499, 501, 506, 507
<i>Physcia leptalea</i> (Ach.) DC.	478, 479, 485a, 487, 489, 490, 491, 494, 495, 497, 502, 505, 508
<i>Physcia tenella</i> (Scop.) DC.	479, 505
<i>Physconia distorta</i> (With.) J.R. Laundon	468, 475, 480, 485a, 487, 488, 489, 491, 494, 495, 496, 497, 499, 507
<i>Physconia enteroxantha</i> (Nyl.) Poelt	468
<i>Physconia perisidiosa</i> (Erichsen) Moberg	507
<i>Physconia servitii</i> (Nádv.) Poelt	494
<i>Physconia venusta</i> (Ach.) Poelt	468, 480, 483, 485a, 488, 490, 491, 494, 495, 496, 507
<i>Placidium rufescens</i> (Ach.) A. Massal.	477
<i>Placidium squamulosum</i> (Ach.) Breuss	476, 492
<i>Platismatia glauca</i> (L.) W.L. Culb. & C.F. Culb.	468, 490

<i>Pleurosticta acetabulum</i> (Neck.) Elix & Lumbsch	468, 478, 479, 480, 490, 491, 495, 496, 507
<i>Polycauliona polycarpa</i> (Hoffm.) Frödén & al.	479
<i>Protoblastenia rupestris</i> (Scop.) J. Steiner	477
<i>Protoparmeliopsis bolcana</i> (Pollini) Lumbsch	509
<i>Pseudevernia furfuracea</i> (L.) Zopf	468
<i>Psora decipiens</i> (Hedw.) Hoffm.	476
<i>Punctelia subrudecta</i> (Nyl.) Krog	483, 485a, 487, 491, 500, 506, 507, 508
<i>Ramalina farinacea</i> (L.) Ach.	468, 475, 479, 483, 485a, 487, 488, 489, 490, 494, 495, 496, 497, 498, 500, 501, 506, 507, 508
<i>Ramalina fastigiata</i> (Pers.) Ach.	468, 485, 489, 490, 494, 495, 496, 499, 507, 508
<i>Ramalina fraxinea</i> (L.) Ach.	468, 495, 496
<i>Rhizocarpon geographicum</i> (L.) DC. s. lat.	509
<i>Ricasolia amplissima</i> (Scop.) De Not.	485b, 494 (hb Brackel 8376)
<i>Rinodina exigua</i> (Ach.) Gray.	479, 488, 502, 506
<i>Rinodina immersa</i> (Körb.) J. Steiner	477
<i>Rinodina sophodes</i> (Ach.) A. Massal.	502
<i>Romularia lurida</i> (Ach.) Timdal	477, 481b
<i>Scytinium lichenoides</i> (L.) Otálora & al.	477, 486
<i>Scytinium teretiusculum</i> (Wallr.) Otálora & al.	491 (hb Brackel 8377)
<i>Solorina saccata</i> (L.) Ach.	476
<i>Stereocaulon vesuvianum</i> Pers.	503, 504
<i>Teloschistes chrysophthalmos</i> (L.) Th. Fr.	505 (hb Brackel 8373)
<i>Tephromela atra</i> (Huds.) Hafellner	489, 506
<i>Thalloidima sedifolium</i> (Scop.) Kistenich & al.	476, 477
<i>Usnea dasopoga</i> (Ach.) Nyl.	485a, 497
<i>Verrucaria nigrescens</i> Pers. f. <i>nigrescens</i>	485b, 492, 496
<i>Xanthoparmelia conspersa</i> (Ach.) Hale	485b, 504, 509
<i>Xanthoparmelia stenophylla</i> (Ach.) Ahti & D. Hawksw.	509
<i>Xanthoria parietina</i> (L.) Th. Fr.	468, 475, 478, 479, 480, 485a, 487, 488, 489, 490, 491, 494, 495, 496, 497, 499, 500, 501, 505, 506, 507, 508

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