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Lichenicolous fungi from Molise (Italy)

Abstract

Brackel, W. von: Lichenicolous fungi from Molise (Italy). — Borziana 1: 53-65. 2020.

During a one week excursion to Molise in 2016, 18 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 four species known only from literature and 45 based on original data. Among these, three species (*Epicladonia stenospora*, *Spirographa triangularis* and *Xenonectriella physciacearum*) are new to Italy and 39 species are new to Molise. In addition, the finds of five lichens new to Molise are mentioned.

Key words: Ascomycotina, Basidiomycotina, lichens, Mediterranean.

Introduction

With 4,438 km² Molise is the second smallest region in Italy. It lies on the border between central and southern Italy and extends from the Adriatic Sea to the Apennines. Whereas the coast is characterised by tourism and some industry, the mountainous southwestern part is dominated by (mostly traditional) agriculture and forests. 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 in the leeward side of the Apennines, the precipitation is much less than on the western side of the Italian peninsula resulting in a poorer lichen flora.

Regarding the study of lichens and lichenicolous fungi it is the less explored region in Italy with 490 species of lichens listed in Nimis (2016) and only seven species of lichenicolous fungi listed in Brackel (2016).

In summer 2016 18 lichenologically interesting sites were visited during a one week excursion to collect lichenicolous fungi (Fig. 1). Here the results of the investigation are presented.

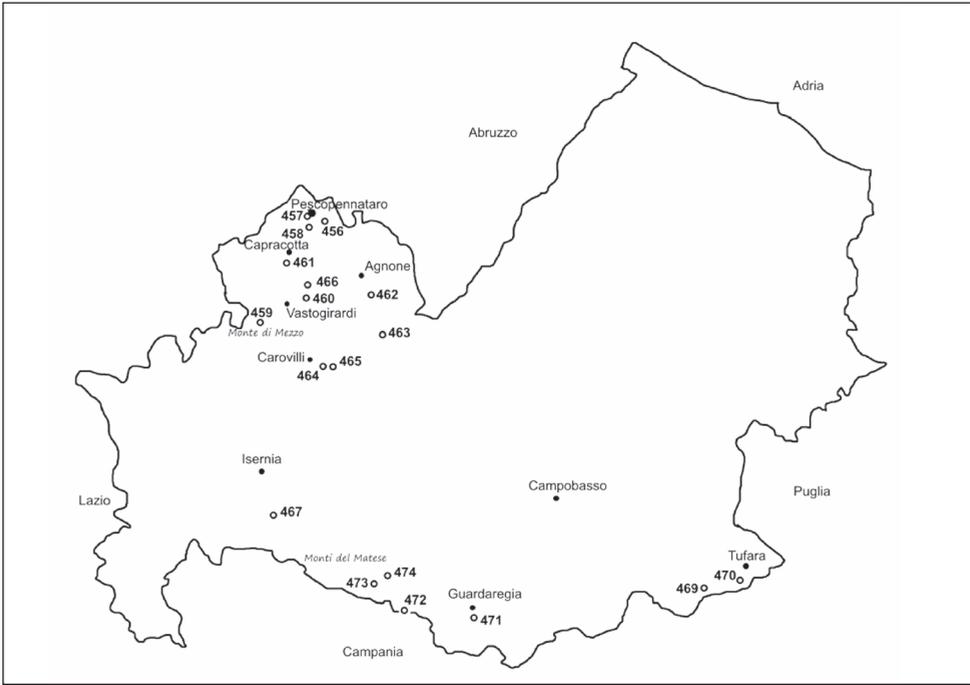


Fig. 1. Location of the collection sites 456–467 and 469–474 in the Molise region. As this study is part of a larger project (the lichenicolous fungi of Italy), here the original numbers of locations are used to avoid confusion.

Materials 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 some repetitive samples of the very common species such as *Athelia arachnoidea* and *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.

Localities

All Italy, Molise (CB = Campobasso, IS = Isernia), leg. W. & G. v. Brackel, det. W. v. Brackel: **456**: IS, SE Pescopennataro near the road to Rosello, 41°51'48.8"N, 14°20'25.5"E, 1060 m, mixed forest, on *Carpinus betulus* (a), *Quercus* spp. (b), *Acer campestre* (c), 8.08.2016. – **457**: IS, S Pescopennataro near the road to Capracotta, 41°52'19.4"N, 14°16'57.9"E, 1140 m, mixed forest, on *Fagus sylvatica* (a), on *Acer campestre* (b), 8.08.2016. – **458**: IS, Pescopennataro, Parco Abete Bianco, 41°51'58.5"N, 14°17'47.2"E, 1245 m, on a group of *Acer campestre*, 8.08.2016. – **459**: IS, Riserva Naturale Monte di Mezzo, between caserma forestale and Valle Frazzina, 41°45'44.4"N, 14°12'42.9"E, 980 m, mixed forest, on *Quercus* spp. (a), on *Acer pseudoplatanus* (b), on *Abies alba* (c), on *Fagus sylvatica* (d), on *Acer campestre* (e), 9.08.2016. – **460**: IS, NE Vastogirardi near the road to Capracotta, 41°46'52.6"N, 14°16'26.9"E, 1120 m, limestone rocks, 9.08.2020. – **461**: IS, S Capracotta, 41°48'44.8"N, 14°15'30.5"E, 1380 m, sparse dry grassland with limestone fragments, 9.08.2016. – **462**: IS, Santa Lucia S Agnone, 41°46'58.6"N, 14°23'18.7"E, 500 m, oak grove in a small creek valley, on *Quercus pubescens*, 10.08.2016. – **463**: IS, SE Pietrabbondante, 41°44'26.5"N, 14°24'08.4"E, 825 m, schistose sandstone, 10.08.2016. – **464**: IS, Riserva Naturale Bosco di Collemeluccio E Carovilli, 41°42'29.5"N, 14°20'35.4"E, 860 m, mixed forest, on *Quercus* spp., *Fagus sylvatica* and *Abies alba*, 10.08.2016. – **465**: IS, Riserva Naturale Bosco di Collemeluccio E Carovilli, 41°42'32.2"N, 14°21'22.7"E, 865 m, sparse row of trees along the forest edge, on *Acer campestre* (a), on *Quercus cerris* (b), 10.08.2016. – **466**: IS, S Capracotta, 41°47'30.5"N, 14°17'34.8"E, 1250 m, limestone rocks along the roadside, 11.08.2016. – **467**: IS, SW Longano near Isernia, 41°32'37.4"N, 14°14'26.0"E, 555 m, olive grove, on *Olea europaea*, 11.08.2016. – **469**: CB, Bosco Mazzocca, 41°26'44.5"N, 14°52'35.4"E, 890 m, sparse oak forest, on *Quercus pubescens*, 12.08.2016. – **470**: CB, Bosco Pianelle SW Tufara, 41°27'07.0"N, 14°54'47.8"E, 940 m, sparse oak forest, on *Quercus pubescens*, 12.08.2016. – **471**: CB, Monti del Matese, S Guardaregia, 41°25'14.8"N, 14°32'20.4"E, 880 m, oak forest, on *Quercus pubescens*, 13.08.2020. – **472**: CB, Monti del Matese, E La Gallinola, 41°25'42.5"N, 14°26'09.3"E, 1630 m, limestone outcrops in a meadow, 13.08.2016. – **473**: CB, Monti del Matese, above Campitello Matese, 41°27'06.6"N, 14°23'53.8"E, 1490 m, limestone outcrops in dry grassland, 13.08.2016. – **474**: CB, Monti del Matese, above Campitello Matese, 41°28'05.8"N, 14°24'57.2"E, 1210 m, on limestone outcrops in dry grassland (a), on *Fagus sylvatica* (b), 13.08.2016.

Results

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 above). The distribution of species in Italy is given after Brackel (2016), in Europe and the world after Brackel (2014). Species new to Molise are indicated with one asterisk (*), species new to Italy with two asterisks (**).

****Abrothallus suecicus* (Kirschst.) Nordin**

458: on *Ramalina fraxinea*, apothecia (hb Brackel 8273, anamorph); **459a:** on *R. calicaris*, apothecia (hb Brackel 8275, anamorph and teleomorph).

In its anamorphic state the species is not rare and known from several regions of Italy. The specimen 8275 is the first find of the sexual state for the country.

****Acolium sessile* (Pers.) Arnold**

465b: on *Pertusaria coccodes*, thallus (hb Brackel 8463).

This is a very rare species growing on epiphytic *Pertusaria* species on old oaks. In Italy it is known from Lombardia, Emilia-Romagna, Liguria, Tuscany, Umbria, Abruzzo, Puglia and Calabria (Puntillo & Puntillo 2009, Nimis & Martellos 2020).

****Arthonia parietinaria* Hafellner & A. Fleischhacker**

462: on *Xanthoria parietina*, thallus (hb Brackel 8481).

Arthonia parietinaria was recently separated from *A. molendoi*; the former grows exclusively on the *Xanthoria parietina* group (*X. parietina*, probably also *X. aureola* and *X. calcicola*), the latter on *Caloplaca* spp. and on *Rusavskia elegans* (Fleischhacker & al. 2016). Most finds of *A. molendoi* s. lat. in Italy are from *Xanthoria parietina*, only a few from *Caloplaca* spp. and *Rusavskia elegans*.

The presence of the two species in the regions of Italy has to be changed in the checklist of the lichenicolous fungi of Italy (Brackel 2016) as follows: *Arthonia molendoi*: **ABR:** Nimis & Tretiach 1999; **BAS:** Brackel 2011; **TAA:** Arnold 1864. *Arthonia parietinaria* (mostly under *A. molendoi* on *Xanthoria parietina*): **ABR:** Brackel 2015; **BAS:** Brackel 2011; **CAL:** Brackel & Puntillo 2016; **LAZ:** Brackel 2015; **MAR:** Brackel 2015; **MOL:** this paper; **SAR:** Fleischhacker & al. 2016, Brackel & Berger 2019; **SIC:** Brackel 2008a; **TOS:** Brackel 2008b; **UMB:** Brackel 2015.

Arthonia varians (Davies) Nyl.

Nimis & Tretiach (1999) report the species from Molise: Pietrabbondante (IS), Mt. Caraceno, on *Lecanora rupicola* s. latiss., 1150 m, 4.04.1977, leg. P.L. Nimis & M. Tretiach.

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

459a: on *Pertusaria pertusa*, thallus (hb Brackel 8460, in the specimen of *Roselliniopsis tartaricola*).

This is a widespread aggressive parasite on a multitude of mostly corticolous lichens, common in polluted areas but also (rarely) present in undisturbed natural habitats.

****Briancoppinsia cytospora* (Vouaux) Diederich, Ertz, Lawrey & van den Boom**

459d: on *Pertusaria pertusa*, thallus (hb Brackel 8462, in the specimen of *Sclerococcum parasiticum*).

This is a widespread parasite on a multitude of lichen genera, known from several Italian regions.

****Cladosporium licheniphilum* Heuchert & U. Braun**

465a: on *Anaptychia ciliaris*, mainly on the cilia (hb Brackel 8454); **456b:** on *Physconia distorta*, thallus (hb Brackel 8455, in the specimen of *Xenonectriella physciacearum*).

This widespread hyphomycete parasites on a multitude of host genera. It is known from several regions of Italy, mainly from the south.

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

463: on *Cladonia convoluta*, basal squamules; **463:** on *Squamarina lentigera*, apothecial disc (hb Brackel 8468).

As Ertz & al. (2015) could show by molecular investigations, *Didymocyrtis cladoniicola* does not grow exclusively on *Cladonia* species; it can also be found on parmelioid lichens as well as on *Ramalina* and *Squamarina*. The species is known only from the *Phoma*-like anamorphic state.

****Didymocyrtis peltigerae* (Fuckel) Hafellner**

461: on *Peltigera rufescens*, thallus (hb Brackel 8451).

This is a widespread species in the northern hemisphere; in Italy it was known until now only from Abruzzo (Brackel 2015, sub *Polycoccum peltigerae*).

****Didymocyrtis ramalinae* (Roberge ex Desm.) Ertz, Diederich & Hafellner**

465b: on *Ramalina* sp., thallus (hb Brackel 8474); on *Evernia prunastri*, thallus (hb Brackel 8475, in the specimen of *Unguiculariopsis lettaui*); **469:** on *Evernia prunastri*, thallus.

A widespread species almost restricted to hosts of the genus *Ramalina* that may occur also on *Evernia prunastri* in populations mixed with *Ramalina* spp. In Italy it is known mainly from the southern parts of the country.

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

458: on *Ramalina fraxinea*, thallus (hb Brackel 8272).

Among the perithecia of *E. ramalinarius* in specimen 8272 we found a coelomycete, that might represent the species anamorph. It has brown, *Phoma*-like conidiomata and orbicular to ovoid, not truncate, hyaline, smooth, thick-walled conidia, (3.0–)3.2–4.2(–4.5) × (2.5–)2.7–3.3(–3.5) μm, l/b = 1.0–1.5(–1.6) (n = 20).

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

463: on *Cladonia convoluta*, basal squamules (hb Brackel 8294).

The species is confined to hosts of the genus *Cladonia*. It is widespread in Europe and was reported also from Alaska, Greenland, Asian Russia and Chile. For the heterogeneity of the taxon see Sérusiaux & al. (2003) and Zhurbenko & Pino-Bodas (2017). In specimen 8294 immersed conidiomata were found, not inducing galls, with a wall brown throughout and aseptate conidia, c. 8–10 × 4–4.5 μm.

Heterocephalacria physciacearum (Diederich) Millanes & Wedin

Brackel (2015) reports the species from Molise: Prov. di Campobasso, near Taverna, coppice forest of *Quercus pubescens*, on *Physcia adscendens*, 41°29'13"N, 14°36'46"E, 745 m, 23.08.2010.

****Intralichen baccisporus* D. Hawksw. & M.S. Cole**

460: on *Caloplaca erythrocarpa*, apothecial disc (hb Brackel 8478).

In the genus *Intralichen* (hyphomycetes) until now four species are known, but the genus is in need of revision, as a lot of intermediates can be found and the specificity of the taxa is not yet clear. Meanwhile specimens growing on other host genera as of the respective type should not be named. *Intralichen baccisporus* was described on *Caloplaca trachyphylla* and is known from several other species of the genus *Caloplaca* s. lat. In Italy it was known until now from Abruzzo, Calabria and Sicily.

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

456b: on *Parmelia sulcata*, thallus; **459:** on *P. sulcata*, thallus; **465:** on *P. sulcata*, thallus; **469:** on *Evernia prunastri*, *Hypogymnia physodes*, *Parmelia sulcata*, *P. saxatilis*, thallus; **471:** on *Parmelia sulcata*, thallus.

This is a cosmopolitan and very common species growing on a multitude of mostly foliose lichens, in Italy known from most of the regions.

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

456a: on *Lecanora carpinea*, apothecial disc (hb Brackel 8455).

This is a widespread and common species, known from several Italian regions, also reported from Molise (Brackel 2015).

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

471: on *Cladonia* sp., basal squamules (hb Brackel 8299, in the specimen of *Milospium lacoizquetae*).

This is a widespread and common parasite growing mainly on the podetia and basal squamules of different *Cladonia* species. In Italy it is known from only a few regions.

****Lichenonium reichlingii* Diederich**

459a: on *Ramalina calicaris*, thallus (hb Brackel 8471).

This is a very rare species known only from *Ramalina farinacea* and *R. fraxinea* from a few European countries; in Italy it was known until now from Basilicata and Calabria. *Ramalina calicaris* is a new host species.

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

459a: on *Ramalina farinacea*, thallus; **465b:** on *R. fraxinea* and *Evernia prunastri*, thalli (hb Brackel 8279).

This is a cosmopolitan species, growing on a multitude of mostly foliose lichens. In Italy it is known from several regions.

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

459a: on *Ramalina farinacea*, thallus (hb Brackel 8277, in the specimen of *Spirographa giselae*).

In the specimen 8277 only a few catathecia of the species could be found intermixed with conidiomata of *Spirographa giselae* on blackened areas of the thallus of *Ramalina fari-*

nacea. The species is known from sparse finds in Europe, the Canary Islands and Asia. In Italy it was found in Calabria, Lazio, Sicily and Veneto.

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

469: on *Pertusaria amara*, thallus (anamorph).

This is a parasymbiotic species growing on lichens of the genera *Pertusaria* s. lat., *Ochrolechia* and probably also on *Lecanora*. As only the anamorph of the species (“*Phaeosporobolus*”) is known and difficult to separate from the anamorphs of other species of *Lichenostigma*, there are many dubious records. Nevertheless, the species seems to be cosmopolitan and is known from several Italian regions.

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

460: on *Circinaria calcarea*, thallus and apothecia (hb Brackel 8270); **474:** on *Lobothallia radiosa*, thallus (hb Brackel 8269, in the specimen of *Muellerella erratica*).

This is an almost cosmopolitan species, also known from several Italian regions. It is confined to hosts of the genera *Lobothallia* and *Aspicilia* s. lat.

****Lichenostigma maureri* Hafellner**

459a: on *Ramalina farinacea*, thallus (hb Brackel 8277, in the specimen of *Spirographa giselae*); **465b:** on *Ramalina* sp., thallus (hb Brackel 8474, in the specimen of *Didymocyrtis ramalinae*); **459a:** on *Pseudevernia furfuracea*, thallus (hb Brackel 8472).

This is a cosmopolitan species growing on a multitude of foliose and fruticose lichens, known also from several Italian regions.

****Merismatium decolorans* (Rehm ex Arnold) Triebel**

463: on *Cladonia convoluta*, basal squamules (hb Brackel 8293); on *C. pocillum*, basal squamules (hb Brackel 8295).

The ascospores in specimen 8295 measure c. $10.5\text{--}15 \times 4.5\text{--}5 \mu\text{m}$; they are smaller than reported by Triebel (1989) [$(10.5\text{--})13.5\text{--}16.5\text{--}(17.5) \times (3.5\text{--})4.0\text{--}5.5\text{--}(6.0) \mu\text{m}$] but lie within the range measured by Zhurbenko & Pino-Bodas (2017) [$(9.3\text{--})11.4\text{--}14.4\text{--}(16.7) \times 3.6\text{--}4.1\text{--}5.5\text{--}(7.0) \mu\text{m}$]. Nevertheless they show the typical septation with (1–)3 transversal septa and occasionally one longitudinal septum in one of the central cells.

The species grows on several epigeic not closely related lichens such as species of *Arthrurhaphis*, *Cladonia*, and *Stereocaulon*. It is widespread over the northern hemisphere; in Italy it was known until now only from Abruzzo (Brackel 2015).

****Milospium lacoizquetae* Etayo & Diederich**

471: on *Cladonia* sp., basal squamules (hb Brackel 8299).

In the specimen 8299 among the typical conidia also exceptionally big ones of up to $25 \mu\text{m}$ diam. were found; in the protologue (Etayo & Diederich 1996) conidial size is given as $7\text{--}14\text{--}(16) \times 6\text{--}10\text{--}(12) \mu\text{m}$.

The species grows on different species of *Cladonia* and is known until now only from Europe, in Italy from Calabria and Tuscany.

****Muellerella erratica* (A. Massal.) Hafellner & V. John**

474: on *Lobothallia radiosa*, thallus (hb Brackel 8269).

This is a cosmopolitan parasymbiont of a multitude of epipetric lichens; in Italy it is known from several regions from the Alps to Sicily.

****Phacographa zwackhii* (A. Massal. ex Zwackh) Hafellner**

457a: on *Phlyctis argena*, thallus (hb Brackel 8441).

This species, confined to hosts of the genus *Phlyctis*, is known until now only from Europe; in Italy it was found in Abruzzo, Basilicata, and Sardinia.

****Phacothecium varium* (Tul.) Trevis.**

462: on *Xanthoria parietina*, thallus and apothecia (hb Brackel 8479).

This is a species confined to hosts of the genus *Xanthoria*, widespread in the northern hemisphere, in Italy known from several regions from the Alps to Sicily, first reported by Jatta (1882: 137) from Puglia.

***Plectocarpon lichenum* (Sommerf.) D. Hawksw.**

459d: on *Lobaria pulmonaria*, thallus (hb Brackel 8452).

This cosmopolitan species, confined to *Lobaria* s. lat., is known from several regions in Italy, also from Molise (Jatta 1875: 237).

****Pronectria pertusariicola* Lowen**

470: on *Pertusaria pertusa*, thallus and ascomatal warts (hb Brackel 8465); **471:** on *P. pertusa*, ascomatal warts (hb Brackel 8466).

Pronectria pertusariicola is confined to epiphytic *Pertusaria* species and known from several countries in Europe, the Canary Islands and Madeira. In Italy it was found mainly in the south.

****Pronectria santessonii* (Lowen & D. Hawksw.) Lowen**

456c: on *Anaptychia ciliaris*, thallus, rarely apothecial discs (hb Brackel 8453).

In specimen 8453 the ascospores measured (10.5–)11.2–13.1(–14.0) × 4.5–5.3(–5.5) μm, l/b = (2.0–)2.2–2.8(–3.1) (n = 20). This is nearer to the measurements given in Berger & al. (in press) than in the protologue of the species (Lowen & Hawksworth 1986).

A rarely reported species; in Italy it was known until now only from Abruzzo and Sicily.

****Roselliniopsis tartaricola* (Nyl. ex Leight.) Matzer**

459a, d: on *Pertusaria pertusa*, thallus (hb Brackel 8460).

In specimen 8460 only old perithecia with few released ascospores were found. Perithecia c. 400 μm in diameter, opening irregularly with fissures; ascospores ellipsoid, brown, smooth, 0–2-septate with non-median septa, sometimes with germination pores, 11–12.5 × 8 μm. In Italy this rare species was known until now only from Calabria (Brackel & Puntillo 2016).

****Sclerococcum homoclinellum* (Nyl.) Ertz & Diederich**

459d: on *Lecanora chlarotera*, thallus and apothecia (hb Brackel 8457).

This is the second record of the species in Italy after the find of Hafellner (1979; as *Dactylopora homoclinella*) in Trentino-Alto Adige. It usually grows on saxicolous lichens

(*Lecanora* spp. and *Tephromela atra*). *Lecanora chlarotera* seems to be a new host species. The 1-septate, brown ascospores in specimen 8457 are somewhat narrower than indicated by Hafellner (1979): $(8.0-)8.3-10.3(-11.0) \times (3.0-)3.4-4.1(-4.5) \mu\text{m}$, $l/b = (1.8-)2.3-2.7(-2.9)$ ($n = 20$) vs. $7.5-9.1-12 \times 4-4.6-6 \mu\text{m}$. More finds are needed to show if the specimens on corticolous *Lecanora* species represent a separate taxon.

****Sclerococcum parasiticum* (Flörke) Ertz & Diederich**

459d: on *Pertusaria pertusa*, thallus (hb Brackel 8462, 8460 in the specimen of *Roselliniopsis tartaricola*).

This is a widespread species, in Italy known from several regions. In specimen 8462 the (1-)3-septate, brown ascospores are on the lower range of the size range given by Hafellner (1979): $10.0-11.8(-13.0) \times (2.5-)3.0-4.4(-5.0) \mu\text{m}$, $l/b = (2.2-)2.5-3.6(-4.4)$ ($n = 20$) vs. $9-11.5-15 \times 3.5-4.3-5 \mu\text{m}$.

****Sphaerellothecium cladoniae* (Alstrup & Zhurb.) Hafellner**

460: on *Cladonia pocillum*, basal squamules (hb Brackel 8292).

This is a widespread species, not rare in arctic-alpine regions, growing exclusively on *Cladonia* species. In Italy it is known from several regions from the Alps to Calabria.

***Sphinctrina turbinata* (Pers.) De Not.**

459a: on *Pertusaria pertusa*, thallus and ascomatal warts (hb Brackel 8459); **471:** on *P. pertusa*, thallus and ascomatal warts (hb Brackel 8467).

This is a widespread but not common species growing exclusively on species of the genus *Pertusaria*, mostly on *P. pertusa*. In Italy it is known from most of the regions (Puntillo & Puntillo 2009; Nimis & Martellos 2020) including Molise (Caporale & al. 2008).

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

459a: on *Ramalina farinacea*, thallus (hb Brackel 8277).

According to the results of molecular studies, Flakus & al. (2019) transferred *Asteroglobohus giselae* to *Spirographa* and noted that it is a hyperparasite on *Lichenopeltella* cf. *ramalinae*. Actually in specimen 8277 *Lichenopeltella ramalinae* was found associated with *Spirographa giselae*. However the relation between both is not yet clear to me, as several conidiomata of *S. giselae* could be observed growing directly on the thallus of *R. farinacea* without any connection to a blackish area on the thallus or to catathecia of *L. ramalinae*.

*****Spirographa triangularis* (Diederich & Etayo) Flakus, Etayo & Miadlikowska**

459a: on *Pertusaria pertusa*, thallus (hb Brackel 8461, teleomorph).

Flakus & al. (2019) showed that *Cornutispora* is the asexual state of *Spirographa* and consequently recombined all *Cornutispora* species to *Spirographa*. For several species the teleomorph-anamorph relation could be shown. Moreover, the molecular investigations showed a high host specificity and *Spirographa triangularis* seems to be restricted to corticolous species of *Pertusaria* s. str.

Specimen 8461 showed following features: ascomata cleistohymenial and seemingly perithecioid, immersed in the host thallus, breaking through the cortex with only the pore and a brown collar visible, immersed part pale brownish, c. 250 μm diameter; hamathecium of septate, sim-

ple paraphyses 1.5–3 µm thick, apically not thickened, longer than the asci; asci cylindrical to clavate, 75–85 × 12–18 µm, I–, K/I–, endoascus dextrinoid, multispored (32?); ascospores hyaline, smooth, fusiform, sharply pointed at both ends, curved or slightly sigmoid, (0–)1(–2)-septate, c. 30–42 × 2–3 µm. Due to the multitude of crowded ascomata the infected thallus areas show gall-like swellings.

The species is known from several European countries as well as from North America.

Stigmidium congestum (Körb.) Triebel

BSM (2006–2020): Molise, Prov. Campobasso, Apennin, Monte Castelbarone, 41°51'36"N, 14°21'53"E, 1180 m, an Rinde von *Quercus* im Buchenwald (*Fagus sylvatica*), auf *Lecanora* cf. *subrugosa* Nyl. (in apoth.), 5.05.1977, leg. H. Hertel, det. D. Triebel (M-0043671).

****Stigmidium hageniae* (Rehm) Hafellner**

465b: on *Anaptychia ciliaris*, thallus (hb Brackel 8464).

This is a rare species, confined to hosts of the genera *Anaptychia* and *Physconia*, known from a few European countries and the Canary Islands; in Italy it was known only from Sardinia.

****Taeniolella delicata* M.S. Christ & D. Hawksw.**

456b: on *Physconia distorta*, thallus (hb Brackel 8455, in the specimen of *Xenonectriella physciacearum*).

This widespread and aggressive parasite grows on a multitude of mostly epiphytic lichens. In Italy it was known until now only from the Tuscany.

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

462: on *Xanthoria parietina*, thallus (hb Brackel 8480).

Teloggalla olivieri is confined to hosts of the genus *Xanthoria*. It is widespread in Europe and in the Middle East and also reported from several regions of Italy.

Toninia episema (Nyl.) Timdal

Nimis & Tretiach (1999) report this species from Molise: below Lupara, along the river Biferno, on *Aspicilia calcarea*, 280 m, 4.04.1997, leg. P.L. Nimis & M. Tretiach; Pesche Natural Reserve (IS), 800 m, 5.04.1997, leg. P.L. Nimis & M. Tretiach.

****Tremella cladoniae* Diederich & M.S. Christ.**

471: on *Cladonia pyxidata* s. lat., basal squamules and podetia (hb Brackel 8297).

This widespread but not common heterobasidiomycete was known in Italy until now only from Lombardia.

****Tremella ramalinae* Diederich**

458: on *Ramalina fraxinea*, thallus (hb Brackel 8274).

In the specimen 8274 *Tremella ramalinae* grew on the apothecial discs causing swellings like *Tremella caloplacae* on *Caloplaca* spp. and *Xanthoria parietina*, which is very unusual; typically it grows on the thallus and produces basidiomata with a constricted base. Nevertheless the basidiomata contained the typical 4-celled basidia (figure 2). *Tremella ramalinae* is widespread in the northern hemisphere and also known from several regions in Italy.

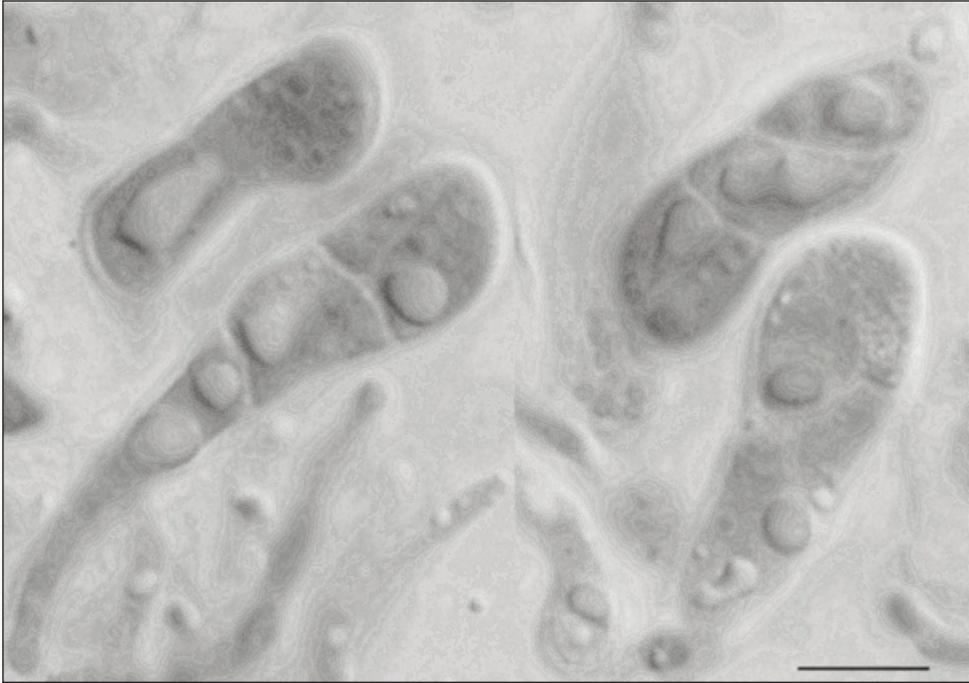


Fig. 2. Basidia of *Tremella ramalinae* (hb Brackel 8276). Bar = 5 μ m.

****Trichonectria rubefaciens* (Ellis & Everh.) Diederich & Schroers**

471: on *Parmelia sulcata* and *P. saxatilis*, thalli (hb Brackel)

This widespread species grows on several foliose and fruticose lichens of the *Parmeliaceae* and *Ramalinaceae*; in Italy it is known from a few regions from the Alps to Sicily.

****Unguiculariopsis lettaui* (Grubmann) Coppins**

465b: on *Evernia prunastri*, thallus (hb Brackel 8475).

This is a species restricted to *Evernia prunastri*, widespread in the northern hemisphere; in Italy it was known until now from Basilicata, Calabria, Lazio, Tuscany, Sardinia, and Trentino-Alto Adige.

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

456b: on *Physcia distorta*, thallus (hb Brackel 8455).

This currently described species (Berger & al. in press) is known from Central and Southern Europe (Germany, Austria, Switzerland, Italy). A revision of the Italian specimens of nectrioid fungi on hosts of the family *Physciaceae* in the herbarium of the author showed the presence of the species in Basilicata, Calabria, Lazio, Lombardia, Sicily and Tuscany. These specimens had been recorded either as *Pronectria echinulata* or as *Xenonectriella/Pronectria leptaleae*. Nevertheless, both of these species proved to be pres-

ent in Italy: *Pronectria echinulata* in Basilicata, Calabria, Marche, Sardinia and Sicily, *Pronectria leptaleae* in Abruzzo, Basilicata and Sicily.

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

456a: on *Melanohalea elegantula*, thallus (hb Brackel 8470).

This is a rarely reported species, known only from a few European countries. In Italy it was known until now from Calabria, Lazio, Puglia and Tuscany. The species is restricted to hosts of the genera *Melanelixia* and *Melanohalea*.

Notes on some lichens new to Molise

Though lichens were not the scope of the investigations, all species searched for lichenicolous fungi were noted. The records are listed in the annex. Comparing the list with the lichen flora of Italy (Nimis 2016, Nimis & Martellos 2020), some of the lichen species proved to be new to Molise (indicated with an asterisk in the annex). Not of all these finds herbarium specimens were taken.

Acknowledgements

I thank Immacolata Catalano (Napoli), Domenico Puntillo (Cosenza) and Sonia Ravera (Roma) for valuable suggestions of lichenologically interesting localities in the studied area.

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Brackel, W.v.: Lichenicolous fungi from Molise (Italy) — Borziana 1: 53-65. 2020.

Electronic Supplementary File1. <https://doi.org/10.7320/Borz.001.053.001>

Version of Record published online on 10 December 2020

List of lichens searched for lichenicolous fungi

The taxa are listed in alphabetical order, followed by the number of the locality. Species new to Molise (according to Nimis & Martellos 2020) are indicated with an asterisc (*).

- Agonimia tristicula* (Nyl.) Zahlbr.: 460.
Anaptychia ciliaris (L.) Flot.: 456, 458, 459, 462, 465, 470, 471, 474.
Arthonia radiata (Pers.) Ach.: 457.
Bacidia fraxinea Lönnr.: 459 (hb Brackel 8315).
Bagliettoa calciseda (DC.) Gueidan & Cl. Roux: 460, 466, 472, 474.
Bilimbia sabuletorum (Schreb.) Arnold: 473.
Bryoria fuscescens (Gyeln.) Brodo & D. Hawksw.: 459.
Calicium adpersum Pers.: 459 (hb Brackel 8313).
Calogaya schistidii (Anzi) Arup & al.: 472.
Caloplaca erythrocarpa (Pers.) Zwackh: 460, 466.
Candelariella aurella (Hoffm.) Zahlbr.: 461, 466, 472, 474.
Candelariella xanthostigma (Ach.) Lettau: 465, 470.
Catapyrenium daedaleum (Kremp.) Stein: 472 (hb Brackel 8344).
Chrysothrix candelaris (L.) J.R. Laundon: 459.
Circinaria calcarea (L.) A. Nordin & al.: 460, 461, 463, 466, 472.
Circinaria contorta (Hoffm.) A. Nordin & al.: 461, 466, 472, 474.
**Cladonia coniocraea* (Flörke) Spreng.: 471.
Cladonia fimbriata (L.) Fr.: 471.
Cladonia foliacea f. *convoluta* (Lam.) Nimis ad int.: 460, 463.
Cladonia pocillum (Ach.) Grognot: 460, 463, 473.
Cladonia rangiformis Hoffm.: 460.
Cladonia symphyocarpa (Flörke) Fr.: 472, 473.
Collema nigrescens (Huds.) DC.: 457, 458, 465.
Diplotomma hedinii (H. Magn.) P. Clerc & Cl. Roux: 460.
Enchylium tenax (Sw.) Gray: 460, 463, 472, 473.
Evernia prunastri (L.) Ach.: 456, 458, 459, 465, 467, 469.
Flavoparmelia caperata (L.) Hale: 459, 464, 467, 469.
Gyalolechia fulgens (Sw.) Søchting & al.: 463.
Gyalolechia fulgida (Nyl.) Søchting & al.: 460.
Hypogymnia physodes (L.) Nyl.: 459, 469.
Kiliasia athallina (Hepp) Hafellner: 466.
Lathagrium auriforme (With.) Otálora & al.: 472.
Lathagrium cristatum (L.) Otálora & al.: 466.
Lecanora allophana (Ach.) Nyl. f. *allophana*: 470, 474.
Lecanora carpinea (L.) Vain.: 456, 462, 467, 474.
Lecanora chlarotera Nyl.: 457, 458, 459, 467, 469, 470, 471, 474.
Lecidella elaeochroma (Ach.) M. Choisy: 456, 457, 458, 465, 467, 469, 471, 474.
Lecidella stigmatea (Ach.) Hertel & Leuckert: 466, 472.
Lepra albescens (Huds.) Hafellner: 469, 470, 474.
Lepra amara (Ach.) Hafellner: 456, 457, 459, 462, 464, 465, 467, 469, 470, 471.
Lepraria incana (L.) Ach. agg.: 457.

Lepraria rigidula (B. de Lesd.) Tønsberg: 456.
Leptogium saturninum (Dicks.) Nyl.: 458.
Lobaria pulmonaria (L.) Hoffm.: 459, 464.
Lobothallia radiosa (Hoffm.) Hafellner: 460, 466, 472, 473, 474.
Melanelixia glabra (Schaer.) O. Blanco & al.: 456, 462, 471, 474.
Melanelixia glabrata (Lamy) Sandler & Arup: 457, 459, 464, 469, 470, 471.
Melanelixia subaurifera (Nyl.) O. Blanco & al.: 456, 467, 474.
Melanohalea elegantula (Zahlbr.) O. Blanco & al.: 456, 471.
Melanohalea exasperata (De Not.) O. Blanco & al.: 456.
Myriolecis crenulata (Hook.) Sliwa & al.: 461.
Myriolecis dispersa (Pers.) Sliwa & al.: 460, 466, 472, 473.
Nephroma laevigatum Ach.: 471.
Ochrolechia pallescens (L.) A. Massal.: 471.
Pannaria conoplea (Ach.) Bory: 471.
Parmelia saxatilis (L.) Ach. agg.: 459, 469, 470, 471.
Parmelia subontana Hale: 456, 471.
Parmelia sulcata Taylor: 456, 457, 458, 459, 464, 465, 467, 469, 471, 474.
Parmelina pastillifera (Harm.) Hale: 456, 459, 467, 471, 474.
Parmelina quercina (Willd.) Hale: 467.
Parmelina tiliacea (Hoffm.) Hale: 456, 458, 459, 462, 467, 469, 470, 471, 474.
Parmotrema perlatum (Huds.) M. Choisy: 456, 462, 467.
Peltigera praetextata (Sommerf.) Zopf: 471.
Peltigera rufescens (Weiss) Humb.: 460, 461, 472, 473.
Pertusaria coccodes (Ach.) Nyl.: 465, 469, 471.
Pertusaria flavida (DC.) J.R. Laundon: 459, 465, 469, 470, 471.
Pertusaria pertusa (L.) Tuck.: 456, 459, 465, 469, 470, 471.
Phaeophyscia endophoenicea (Harm.) Moberg: 471 (hb Brackel 8343).
Phaeophyscia orbicularis (Neck.) Moberg: 462, 467, 474.
Phlyctis argena (Spreng.) Flot.: 456, 457, 459, 471.
Physcia adscendens H. Olivier: 458, 462, 467.
Physcia aipolia (Humb.) Fürnr.: 456, 458, 462, 465, 467, 474.
Physcia leptalea (Ach.) DC.: 462, 467.
Physcia stellaris (L.) Nyl.: 474.
Physcia tenella (Scop.) DC.: 456, 458.
Physconia distorta (With.) J.R. Laundon: 456, 459, 465, 467, 470, 474.
Physconia grisea (Lam.) Poelt: 458.
Physconia muscigena (Ach.) Poelt var. *muscigena*: 460.
Physconia venusta (Ach.) Poelt: 458, 462, 465, 471.
**Placidium squamulosum* (Ach.) Breuss: 463 (hb Brackel 8346), 472.
Platismatia glauca (L.) W.L. Culb. & C.F. Culb.: 470.
Pleurosticta acetabulum (Neck.) Elix & Lumbsch: 456, 458, 459, 465, 467, 470, 471, 474.
Protoblastenia rupestris (Scop.) J. Steiner: 460, 472.
Protoparmeliopsis muralis (Schreb.) M. Choisy: 460, 466.
Pyrenodesmia variabilis (Pers.) A. Massal.: 466.
Ramalina calicaris (L.) Fr.: 459 (hb Brackel 8310).
Ramalina farinacea (L.) Ach.: 456, 458, 459, 462, 464, 465, 467, 469, 470, 471.
Ramalina fastigiata (Pers.) Ach.: 456, 459, 462, 465, 470.
Ramalina fraxinea (L.) Ach.: 456, 458, 465, 470.
**Rinodina bischoffii* (Hepp) A. Massal.: 461, 466.
Rinodina immersa (Körb.) J. Steiner: 466.
Romjularia lurida (Ach.) Timdal: 460.
Rusavskia elegans (Link) S.Y. Kondr. & Kärnefelt: 466, 472.
Sarcogyne regularis Körb.: 460, 461, 466.

Scytinium lichenoides (L.) Otálora & al.: 460, 473.

**Squamarina lentigera* (Weber) Poelt: 463 (hb Brackel 8468, in the specimen of *Didymocyrtis cladoniicola*).

Thalloidima sedifolium (Scop.) Kistenich & al.: 463, 473.

**Usnea dasopoga* (Ach.) Nyl.: 459 (hb Brackel 8345).

Verrucaria muralis Ach.: 461, 463, 472.

Verrucaria nigrescens Pers. f. *nigrescens*: 460, 461, 463, 466.

Xanthoria parietina (L.) Th. Fr.: 456, 458, 459, 462, 465, 467, 470, 471, 474.