Approach to the mycological catalogue of the Dehesa of Somosierra and new records for the Community of Madrid (Spain)

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Abstract. An approach to the mycological catalogue of the Dehesa of Somosierra, in the northeast corner of the Community of Madrid, has been carried out. The expeditions were accomplished from April 2013 to October 2015. A total of 96 species were identified belonging to 45 families and 18 orders. To the best of our knowledge, it is the first time that the species as *Hyalorbilia inflatula*, *Panellus serotinus* and *Vibrissea filisporia f. boudieri* have been cited in the Community of Madrid.

Keywords: Mycology; diversity; *Hyalorbilia inflatula*; *Panellus serotinus*; *Vibrissea filisporia f. boudieri*.

Introduction

The Fungal Kingdom is one of the most diverse group of organisms in the world. Last estimations suggest a number from 0.8 to 5.1 million species, although only 100.000 are named. The importance of this group in the world is extremely big: They are the basis of the trophic chains participating in soil carbon cycling, they are source of food and source of the most important antibiotics. Therefore, the mycological knowledge is of global interest (Tedersoo et al. 2014; Royal Botanic Gardens Kew: https://stateoftheworldsfungi.org/).

As part of our research of the Dehesa of Somosierra (Lázaro-Lobo et al. 2017), an approach to the mycological biodiversity of the Dehesa of Somosierra have been carried out.

This zone is located in the northern area of the Community of Madrid (Spain), inside the Sistema Central mountain range with an extension of 98 ha. The geology of this region is characterized by the presence of gneisses, marbles and schists, which confers acid properties to the substrate and determines the presence of a characteristic mycobiota (Díaz Martínez et al. 2012). Due to the orographic situation, it is located in a valley with abundant rainfall and an average height of 1450 m. It has a characteristic climate of the Atlantic area of Central Europe with an average annual temperature and precipitation of 8.6 °C and 588 mm, respectively (Climate-Data.org: Climate data for cities worldwide 2019). It should be noted the presence of trees of these climatic areas such as: *Betula pendula* subsp. *fontqueri*, *Corylus*...
avellana or Quercus petraea. This type of climate, and therefore vegetation, makes the mycological richness different from other places of the Community of Madrid.

The aim of this research is to contribute to the mycological knowledge of the Community of Madrid. In a previous study, Ruiz et al. (2013) found, in this area, the first locations of Coprinopsis xenobia for the Iberian Peninsula. Therefore, because of this work and the absence of an intensive study of the mycological diversity of the Dehesa of Somosierra, we decided to choose this place for a deep study following the same strategy as in other Spanish regions (Moreno & López-González 1978, Campos et al. 2014, Ribes et al. 2016, Pancorbo et al. 2017).

Materials and Methods

Sample collections have been carried out within different expeditions during more than two years, from April 2013 to October 2015, along the different seasons of the year. All the specimens have been lodged at the Herbarium of the Faculty of Biology (MACB), Complutense University, Madrid (Spain) following the same strategy described in Lázaro-Lobo et al. (2017). Only species that have been clearly determined are presented in the study. Doubtfully determinations have been excluded in the final catalogue (Table 1). All the identified species have been cited according to the Index Fungorum website (www.indexfungorum.org/).

Table 1. Family, species name and herbarium number of the catalogue.

| PHYLLUM  | ASCOMYCOTA |
|----------|------------|
| ORDEN    | CONOPHORALES |
| Bertiaceae |            |
| Bertia moriformis (Tode) De Not. | MACB 109940 |
| ORDEN    | HELOTIALES |
| Hemiphacidiaceae |      |
| Mitrula paludosa Fr. | MACB 109977 |
| Hyaloscyphaceae |          |
| Brunnipila calyculiformis (Schumach.) Baral | MACB 109943 |
| Perrotia flammea (Alb. & Schwein.) Boud. | MACB 109987 |
| Rhytismataceae |         |
| Propolis farinosa (Pers.) Fr. | MACB 109997 |
| Vibrisseaceae |           |
| Vibrissea filisporia f. boudieri A. Sánchez & Korf | MACB 110021 |
| Vibrissea truncorum (Alb. & Schwein.) Fr. | MACB 110022 |
| ORDEN    | HYPOCREALES |
| Hypocreaceae |         |
| Hypomyces chrysospermus Tul. & C. Tul. | MACB 109960 |
| ORDEN    | ORBILIALES |
| Orbiliaceae |            |
| Hyalorbilia inflatula (P. Karst.) Baral & G. Marson | MACB 109958 |
| ORDEN    | PEZIZALES |
| Ascobolaceae |           |
| Ascobolus furfuraceus Pers. | MACB 109938 |
| Pezizaceae |            |
| Adelphella babingtonii (Sacc.) Pfister, Matočec & I. Kušan | MACB 109929 |
| Peziza michelii (Boud.) Dennis | MACB 109988 |
| FAMILIA | ESPECIE | AUTOR | NÚMERO MACB |
|---------|---------|-------|-------------|
| Pyronemataceae | Cheilymenia stercorea (Pers.) Boud. | | MACB 109946 |
| | Trichophaea woolhopea (Cooke & W. Phillips) Boud. | | MACB 110017 |
| ORDEN XYLARIALES | | | |
| Diatrypaceae | Diatrypella quercina (Pers.) Cooke | | MACB 109953 |
| | | | |
| Hypoxylaceae | Annulohypoxylon multiforme (Fr.) Y.M. Ju, J.D. Rogers & H.M. Hsieh | | MACB 109935 |
| | Hypoxylon fuscum (Pers.) Fr. | | MACB 109961 |
| Xylariaceae | Xylaria hypoxylon (L.) Grev. | | MACB 110024 |
| ORDEN AGARICALES | | | |
| Agaricaceae | Agaricus litoralis (Wakef. & A. Pearson) Pilát | | MACB 109930 |
| | Bovista nigrescens Pers. | | MACB 109942 |
| | Lycoperdon pyriforme Schaeff. | | MACB 109974 |
| | Vasceullum pratense (Pers.) Kreisel | | MACB 110019 |
| Amanitaceae | Amanita muscaria (L.) Lam. | | MACB 109933 |
| | Amanita rubescens Pers. | | MACB 109934 |
| Cortinariaceae | Cortinarius hemitrichus (Pers.) Fr. | | MACB 109950 |
| Hydnangiaceae | Laccaria amethystina Cooke | | MACB 109963 |
| | Laccaria laccata (Scop.) Cooke | | MACB 109964 |
| | Laccaria pumila Fayod | | MACB 109965 |
| | Laccaria tortilis (Bolton) Cooke | | MACB 109966 |
| Hymenogastraceae | Psilocybe montana (Pers.) P. Kumm | | MACB 110001 |
| | Psilocybe subcoprophila (Britzelm.) Sacc. | | MACB 110002 |
| | Incertae sedis | | |
| | Panaeolus papilionaceus (Bull.) Quél. | | MACB 109980 |
| | Panaeolus semiovatus (Sowerby) S. Lundell & Nannf. | | MACB 109981 |
| Inocybaceae | Inocybe geophylla (Bull.) P. Kumm. | | MACB 109962 |
| | Simocybe haustellaris (Fr.) Walting | | MACB 110009 |
| Marasmiaceae | Crinipellis scabella (Alb. & Schwein.) Murrill | | MACB 109951 |
| | Marasmius epiphyllus (Pers.) Fr. | | MACB 109975 |
| | Marasmius oreades (Bolton) Fr. | | MACB 109976 |
| Mycenaceae | Mycena galericulata (Scop.) Gray | | MACB 109978 |
| | Mycena pura (Pers.) P. Kumm. | | MACB 109979 |
| | Panellus serotinus (Pers.) Kühner | | MACB 109982 |
| | Panellus stipticus (Bull.) P. Karst. | | MACB 109983 |
| Orden          | Genus                        | Espécimen   |
|---------------|------------------------------|-------------|
| Omphalotaceae | Gymnopus aquosus             | MACB 109955 |
|               | Armillaria mellea (Vahl) P. Kumm. | MACB 109936 |
|               | Flammulina velutipes (Curtis) Singer | MACB 109954 |
| Plateaceae    | Plateus phlebophorus (Ditmar) P. Kumm. | MACB 109993 |
| Psathyrellaceae | Coprinellus brevisetulosus (Arnolds) Redhead, Vilgalys & Moncalvo | MACB 109948 |
|               | Coprinellus domesticus (Bolton) Vilgalys, Hopple & Jacq. Johnson | MACB 109949 |
|               | Parasola plicatilis (Curtis) Redhead, Vilgalys & Hopple | MACB 109984 |
|               | Psathyrella spadiceogrisea (Schaeff.) Maire | MACB 109999 |
| Strophariaceae | Agrocybe praecox (Pers.) Fayod | MACB 109931 |
|               | Agrocybe vervacti (Fr.) Singer | MACB 109932 |
|               | Cycloxye aegerita (V. Brig.) Vizzini | MACB 109952 |
|               | Pholiota squarrosa (Vahl) P. Kumm. | MACB 109989 |
|               | Protostropharia semiglobata (Batsch) Redhead, Moncalvo & Vilgalys | MACB 109998 |
| Tricholomataceae | Arrhenia griseopallida (Desm.) Watling | MACB 109937 |
|               | Clitocybe odora (Bull.) P. Kumm. | MACB 109947 |
|               | Tricholoma sejunctum (Sowerby) Quél. | MACB 110015 |
|               | Tricholoma sulphureum (Bull.) P. Kumm. | MACB 110016 |
| ORDEN AURICULARIALES |                          |             |
| Auriculariaceae | Auricularia mesenterica (Dicks.) Pers. | MACB 109939 |
| ORDEN BOLETALES |                          |             |
| Boletaceae    | Boletus edulis Bull.         | MACB 109941 |
|               | Chalciporus piperatus (Bull.) Bataille | MACB 109945 |
|               | Leccinum varicicolor Watling | MACB 109972 |
|               | Porphyrrellus porphyrosporus (Fr. & Hök) E.-J. Gilbert | MACB 109995 |
| Paxillaceae   | Paxillus involutus (Batsch) Fr. | MACB 109985 |
| ORDEN CANTHARELLALES |                          |             |
| Botryobasidiaceae | Haplotrichum conspersum (Link) Hol.-Jech. | MACB 109957 |
| Cantharellaceae | Cantharellus cibarius Fr. | MACB 109944 |
|               | Pseudocraterellus undulatus (Pers.) Rauschert | MACB 110000 |
| ORDEN CORTICIALES |                          |             |
| Corticiaceae  | Vuilleminia comedens (Ness) Maire | MACB 110020 |
| ORDEN GEASTRALES |                          |             |
| Geastraceae   | Sphaerobolus stellatus Tode | MACB 110010 |
| ORDEN HYMENOCHAETALES |  |
|-------------------------|--------------------------|
| **Hymenochaetales**     |  |
| *Hymenochaete rubiginosa* (Dicks.) Lev. | MACB 109959 |
| *Phellinus igniarius* (L.) Quél. | MACB 109991 |
| **Repetobasidiales**    |  |
| *Rickenella fibula* (Bull.) Rainthelh. | MACB 110004 |
| *Rickenella swartzii* (Fr.) Kuyper | MACB 110005 |

| ORDEN POLYPORALES |  |
|-------------------|--------------------------|
| **Fomitopsidales** |  |
| *Piptoporus betulinus* (Bull.) P. Karst. | MACB 109992 |
| *Postia subcaesia* (A. David) Jülich | MACB 109996 |
| **Polyporales**    |  |
| *Lopharia spadicea* (Pers.) Boidin | MACB 109973 |
| *Polyporus arcularius* (Batsch) Fr. | MACB 109994 |
| *Trametes ochracea* (Pers.) Gilb. & Ryvarden | MACB 110013 |
| **Xenasmatales**   |  |
| *Xenasmatella vaga* (Fr.) Stalpers | MACB 110023 |

| ORDEN Pucciniales |  |
|------------------|--------------------------|
| **Pucciniaceae** |  |
| *Gymnosporangium clavariiforme* (Wulfen) DC. | MACB 109956 |
| *Puccinia asphodeli* Moug. | MACB 110003 |
| *Uromyces ficariae* (Schumach.) Lev. | MACB 110018 |
| **Phragmidiaceae** |  |
| *Phragmidium mucronatum* (Pers.) Schltld. | MACB 109990 |

| ORDEN RUSSULAELES |  |
|------------------|--------------------------|
| **Peniophorales** |  |
| *Peniophora quercina* (Pers.) Cooke | MACB 109986 |
| **Russulales**   |  |
| *Lactarius aurantiacus* (Pers.) Gray | MACB 109967 |
| *Lactarius glycosmus* (Fr.) Fr. | MACB 109968 |
| *Lactarius lacunarum* Romagn. ex Hora | MACB 109969 |
| *Lactarius pyrogalus* (Bull.) Fr. | MACB 109970 |
| *Lactarius turpis* (Weinm.) Fr. | MACB 109971 |
| *Russula gracillima* Jul. Schäff. | MACB 110006 |
| *Russula risigallina* (Batsch) Sacc. | MACB 110007 |
| **Stereaceae**   |  |
| *Stereum hirsutum* (Willd.) Pers. | MACB 110011 |
| *Stereum rugosum* Pers. | MACB 110012 |

| ORDEN SEBACINALES |  |
|-------------------|--------------------------|
| **Sebacinaceae**  |  |
| *Sebacina grisea* Bres. | MACB 110008 |

| ORDEN TREMELLALES |  |
|------------------|--------------------------|
| **Tremellaceae** |  |
| *Tremella mesenterica* Retz. | MACB 110014 |
Macroscopic studies have been performed with descriptions of the specimens regarding size, colour, taste or smell. Tests with different chemical compounds such as Fe$_2$SO$_4$, Guaiac or KOH 5% (m/v) have been done when the correct identification of the species required them. For the microscopic study, an optical microscope OPTIKA B-353 PL has been used. In most cases fresh material has been examined. In the case of dehydrated material, the samples have been rehydrated previously in KOH 5% (m/v). Different dyes have been applied in the microscopic preparations: Congo Red, IKI reagentment, cresyl blue or fenicade fuchsine. Microscopic measurements were performed with the software Piximètre (Henriot & Cheype 2016).

A voucher of each identified species has been lodged at MACB Herbarium as it has above mentioned.

**Results and Discussion**

Along different expeditions, 96 species belonging to 45 families and 18 orders have been collected and identified (Table 1). All the species belong to the two big phyla of higher fungi Basidiomycota and Ascomycota (figure 1). The absence of representatives of other phyla such as Zygomycota, Glomeromycota, or Chytridiomycota is due mainly to the fact that most of the fungi that have epigeous and visible fruiting bodies belong to these two phyla (Blackwell et al. 2012). According to our results, the phylum Basidiomycota is the most represented, perhaps for the same reason. Even though within Ascomycota and Basidiomycota the distribution of taxonomic groups is similar, based on the data collected in this study (Figure 1). It should be noted that all genera within the phyla Ascomycota are represented just by one species, except *Vibrissea*, a genus linked to very humid areas. On the other hand, within Basidiomycota, we found two very well represented genera, *Laccaria* and *Lactarius*. The species of both genera are mycorrhizal and tend to have a predilection for humid places, as quagmires. However, genera that were abundant in similar works, for example, *Boletus, Amanita* or *Cortinarius*, are not well represented in the studied area (Campos et al. 2014, Pancorbo et al. 2017).

This richness of species from different taxonomic groups could be explained by the presence of a varied vegetation as well as by the climatology. There are several plants that reflect the presence of certain associated mycorrhizal fungi. It should be noted, the existence of *Betula pendula* subsp. *fontqueri*, as it is the largest concentration of birches in the Community of Madrid. We found exclusive species linked to these trees, such as *Lactarius glyciosmus*, *Lactarius turpis*, *Leccinum varicolor* or *Piptoporus betulinus* (birch parasitic). Furthermore, the presence of birch trees is highly related to the existence of almost constant water flows, specifically, in the Dehesa of Somosierra. Those trees can be found in areas of quagmires that have water even in the driest months of the year. These microhabitats harbor species as *Adelphella babingtonii*, *Mitrula paludosa* or *Rickenella fibula*. However, most of the species identified in this work, have not been mentioned in a previous work focused on birches of other areas of Madrid (Moreno & López-González, 1978). Only 9 of the 29 species cited appear in our study area (*Amanita muscaria*, *Amanita rubescens*, *Armillaria mellea*, *Inocybe geophylla*, *Lactarius glyciosmus*, *Paxillus involutus*, *Pholiota squarrosa* and *Piptoporus betulinus*).

During our herborizations and for the best of our knowledge three species had been gathered for the first time in the Community of Madrid (Figure 2). These species are *Hyalorbilia inflatula*, a very small species (2-3 mm diameter) characterized by its cylindrical spores narrower than 1.2 μm. It is widespread in Europe and present in Jaen, Barcelona, Canary Islands and Basque Country (Quijada et al. 2015). Another species is *Vibrissea filisporia f. boudieri*, a rare form characterized by its long spores, measuring between 200 and 300 μm, and by the presence of more than 15 septa in each spore (Sanchez 1967). In this collection, the spores were 230 × 2.5 μm long on average and had more than 20 septa. Finally, *Panellus serotinus*, a species well characterized macroscopically, is an uncommon species cited widely in the northern area of Spain with a preference for beeches, although in this case it has been found growing on *Betula pendula* subsp. *fontqueri* (Moreno & García Manjón 2010, Moreno et al. 1986, Esteve-Raventós et al. 2007). Maybe, this is the reason why it has not been cited previously in the Community of Madrid. The closest report for
this species corresponds to the province of Segovia on *Fagus sylvatica* (García Blanco, Sanz Carazo & Del Val, 31-oct-1994, MA-Fungi 54233). The presence of these species in this area is due to its special climatic and geomorphology characteristics. Although it corresponds to the Mediterranean biogeographic region, the high rain and humidity allow the presence of Eurosiberian elements (Worldwide Bioclimatic Classification System 1996-2019). That could explain the existence of their associated fungal species.

![Mycological richness of Dehesa de Somosierra by taxonomic groups.](image1)

**Figure 1.** Mycological richness of Dehesa de Somosierra by taxonomic groups.

![Image of mushrooms.](image2)

**Figure 2.** a) *Panellus serotinus* (MACB 109982), b) *Hyalorbilia inflatula* (MACB 109958) and c) *Vibrissea filisporia f. boudieri* (MACB 110021). The scale bars correspond to 4 cm in image a and to 5 mm in b and c.
The study shows a rich abundance of species but there are quite a few genera not well represented. To increase the number of records, it is essential to continue exploring this area since, given its climatological and floristic characteristics, very interesting fungal species could be found. It is also worth noting that *Hyalorbilia inflatula*, *Panellus serotinus* and *Vibrissea filisporia f. bouderi* have been reported for the first time in the Community of Madrid province.

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