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Review

The macromycetes of the General Mycological Herbarium of the museum of Agricultural Sciences in Portici, Italy

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Abstract
The General Mycological Herbarium of the Royal School of Agriculture of Portici, is currently preserved at the Museum of Agricultural Sciences (MUSA) of the University of Naples Federico II, Portici, Naples, Italy. This contribution presents the analysis of the collection through a process of revision and cataloguing, with the aim of reconstructing the academic dynamics that led to its formation and subsequent expansion. In particular, the contribution of the two main curators of the Herbarium is highlighted: Orazio Comes (1848–1917) and Alessandro Trotter (1874–1967), professors of Botany and Plant Pathology, who succeeded each other at the same institution. The work consists of the analysis of fifteen package relating to macromycetes present in the collection. The study defines the specimens from a taxonomic and historical-scientific point of view, evaluating their provenance and period of collection. These materials, partly from personal collections and partly from exsiccatae series, offer a snapshot of the network of national and international scientific exchanges and collaborations active between the late 19th and early 20th centuries, which formed the basis for the development of modern mycology.

Keywords
Orazio Comes, Alessandro Trotter, Exsiccatae, macromycetes, collections, MUSA, Italy

Introduction

Natural history collections represent a valuable heritage for museums and academic societies. The preservation of a variety of specimens enables long-term analysis of natural systems, ecological changes, and the evolution of scientific thought (Lane, 1996; Walker, 2017). The General Mycological Herbarium of the Royal Higher School of Agriculture of Portici is a paradigmatic example of this value: a historical collection that offers insights into the development of mycology in southern Italy between the late 19th and early 20th centuries (Mazzoleni and Pignattelli, 2007; Marziano and De Natale, 2007).

This study focuses on the section of the Herbarium dedicated to macromycetes, offering an integrated interpretation of its contents from historical, taxonomic, and scientific perspectives.

Following its establishment, the Herbarium was gradually enriched over the subsequent years through contributions from individual collectors and mycologists active in the Neapolitan academic context. A substantial part of its growth was also driven by the acquisition of purchasable collections (specimens prepared and offered for sale by contemporary mycologists to facilitate the dissemination of study material and to support their research financially). Today, it stands as a valuable resource for studying fungal biodiversity, the evolution of museological practices, and scientific exchange networks among institutions.

Brief history of Neapolitan mycology and the key figures of Comes, Trotter, and their academic network

A first historical synthesis of mycological studies in the Campania region was proposed in "I funghi della Campania" (Roca et al., 2007), which outlines the development of local mycological knowledge up to the emergence of a Neapolitan mycological school. Attention to fungi in Campania was notably maintained by the Camaldolese and Benedictine monk communities, who, between the Middle Ages and the Renaissance, studied macrofungi for their medicinal and dietary properties.

During the Renaissance, Giovan Battista Della Porta, in "Phytognomonica" (Della Porta, 1589) proposed the use of seed-like structures (actually spores) as a reproductive means for fungi. He described the development and ecology of species such as *Polyporus tuberaster* (Jacq. ex Pers.) Fr., and distinguished between "natural" (wild) and "artificial" (cultivated) fungi, including early practices for the cultivation of *Cyclocybe cylindracea* (DC.) Vizzini & Angelini. Fabio Colonna, Della Porta's successor and a member of the Accademia dei Lincei, enriched the taxonomic understanding of fungi in his treatise "Ekphrasis" (Roca et al., 2007), providing detailed morphological descriptions of species such as *Pleurotus eryngii* (DC.) Quél., *Macrolepiota procera* (Scop.) Singer, and *Clathrus ruber* P. Micheli ex Pers., along with vernacular names used in Campania.

In the 19th century, Naples experienced a flourishing of mycological studies. Stefano Delle Chiaje, in his "Enchiridio di tossicologia teorico-pratica" (Traverso, 1903), analyzed toxic syndromes caused by mushroom ingestion, offering precise morphological characterizations and a hand-colored atlas, including an extensive description of *Amanita muscaria* (L.) Lam. A major contribution came from Vincenzo Briganti and his son Francesco, whose "Historia fungorum regni neapolitani" (Briganti and Briganti, 1848) described 60 species of Agaricales across five fascicles, supported by 46 detailed illustrations. This work, represented a critical step in consolidating regional mycological knowledge. In 1864, F. Briganti published "Intorno ai mezzi per prevenire gli avvelenamenti per funghi in queste provincie meridionali d'Italia", a treatise proposing regulatory measures for the sale of mushrooms and warning against misidentifications between edible and toxic species in southern Italian markets (Briganti, 1864). Finally, Guglielmo Gasparrini contributed to the understanding of fungal reproduction through his studies on *P. tuberaster*, supporting the idea that fungi reproduce through microscopic reproductive bodies (spores) (Gasparrini, 1841).

In the successive period neapolitan mycology was taken up by Giuseppe De Notaris and Vincenzo Cesati. Both men were of Lombard origin. They held academic positions at the University of Naples Federico II as professors of botany and directors of the Naples Botanical Garden (Pedicino, 1877a). The two were known for their mutual esteem and collaboration and their common intent to foster cryptogamic research in Italy by creating a comprehensive collection of mosses, lichens, ferns

and fungi. Their collaboration resulted in the foundation of the Italian Cryptogamic Society in 1858 (Cesati and De Notaris, 1858; De Notaris and Baglietto, 1870; Pedicino, 1877b). Both De Notaris G. and Cesati V. worked to create a network in the Italian botanical community (De Notaris and Baglietto, 1870). Cesati V. was especially instrumental in fostering a vibrant scientific environment in Naples. He led a diverse and dynamic group of scholars, including Giuseppe Balsamo, Antonio Jatta, Orazio comes, and other naturalists who contributed to the formation of a collaborative and interdisciplinary research network (Balsamo et al., 1885; Balsamo, 1913).

Within this context, Comes O. (Monopoli, 11 November 1848 – Portici, 13 October 1917) entered the academic scene. He assumed a central role in mycological research, with its publication "Funghi del napolitano" (Comes, 1878) and for managing the mycological collections as professor of Botany and Plant Pathology at the Royal Higher School of Agriculture of Portici (Alippi-Cappelletti, 1982). The school at Portici was established in 1872 and Comes O. collaborated with the botany professor Nicola Pedicino, whom he would later succeed in 1875 (Doria, 1977). His direct connection with both Cesati V. and Pedicino N. facilitated the development of a mycological collection intended for teaching and research, especially since these two researchers collected a significant portion of the specimens in the Herbarium.

Although his initial focus was on mycology, broadly and macromycetes in particular, Comes O. gradually shifted his focus to agricultural cryptogamy, as outlined in his seminal work "Crittogamia agraria" (Comes, 1891). Over time, Comes O. became especially renowned for his studies and collections related to tobacco, culminating in detailed investigations on the genus *Nicotiana* and in works such as "Sulla sistemazione botanica dei tabacchi" (Comes, 1896) and "La profilassi nella patologia vegetale" (Comes 1916), which marked his full transition toward applied plant pathology and agronomic studies.

Comes O. died in 1917, and the stewardship of the Herbarium passed to Alessandro Trotter (Udine, 26 July 1874-Vittorio Veneto, 22 July 1967), who officially assumed the position in 1920, following a brief interim under Oreste Bordiga (Gabbrielli, 2005). Trotter A. added numerous specimens from his personal collections and European exsiccatae series, enhancing the collection's taxonomic breadth and completeness. The close relationship between Trotter A. and the Saccardo family, particularly with Domenico Saccardo, Trotter's brother-in-law and the son of the eminent Pier Andrea Saccardo, was instrumental in further enriching the Herbarium.

History and formation of the General Mycological Herbarium of Portici

The origins of the Herbarium are not definitively documented. Archival and material evidence suggests that the collection was initiated by Comes O. between 1870 and 1880 (Comes, 1878). As previously noted, the Herbarium's composition includes specimens from various mycologists, as well as materials from other collections. Comes O. himself stated that some of the specimens he studied had been provided by various mycologists. He is known to have examined the specimens of the Briganti V. mycological collection, which reportedly included materials dating back to Domenico Cirillo. Although this attribution has been disputed by handwriting analyses (Ricciardi and Castellano, 2014), it remains to be verified whether the Herbarium includes samples collected by Briganti V., or if previously unknown traces of mycological activity by Cirilli D. can be found. Such evidence would provide an earlier date for the origin of the Herbarium and demonstrate the involvement of several mycologists in its early development.

What is certain is that, in his work "Reliquie micologiche notarisiane", Comes O. declared he had received a series of mycological specimens from Pedicino N. (Comes, 1883). These belonged to a fungarium assembled by De Notaris G. and included samples collected by various authors such as Ludovico Caldesi, Giovanni Arcangeli, and Antonio Carestia. Trotter A. took over the collection after Comes' death in 1917 and undertook a significant expansion of the Herbarium in 1928.

Fig. 1 - Location of the General Mycological Herbarium of Portici. A) Map of Italy and geographical location of the herbarium (red dot) in Portici, Naples. B) Seat of the Department of Agricultural Sciences and of MUSA (Center for Agricultural Science Museums) of the University of Naples Federico II, housed in the Royal Palace of Portici, built in 1738. C) Organization of the herbarium into packages and conservation in a climate-controlled area at the Department of Agricultural Sciences.

Although it is not possible to pinpoint the exact date of the Herbarium's foundation, the final structure account specimens form personal collections, academic donations, and acquisitions from purchased fungaria. This complexity not only indicates the evolving scientific interest in fungi during that period but also reveals the academic relationships cultivated over time. Actually, The General Mycological Herbarium of Portici is located within the Department of Agricultural Sciences of the University of Naples Federico II, housed in the Royal Palace of Portici. The collection is managed

by MUSA (Museum of Agricultural Sciences). The herbarium is situated at Via Università 100, 80055 Portici (Naples), Italy, (40°48′41.7″ N, 14°20′35.2″ E). Specimens are systematically organized into packages and preserved in a dedicated climate-controlled area to ensure optimal conservation conditions (Fig. 1).

Structure and organization of the General Mycological Herbarium of Portici

The whole Herbarium (including the phytopathological portion) currently consists of approximately 11,000 specimens grouped into 57 packages (Marziano and De Natale, 2007). Each containing folders organized by family, genus, and species. These folders serve as the primary archival units and follow a detailed structure: within each folder are subfolders grouped by genus, each containing sheets divided by species (Fig. 2A), Each sheet contains dried specimens, affixed with metal pins in paper bags. Specimen labels include information such as collection date, location, collector's name, and, in some cases, details on the collection from which they were transferred. Several specimens bear the acquisition stamp "Acq.1928," indicating their incorporation during the management of the Herbarium by Trotter A. (Fig. 3A). Within each genus, species sheets are arranged in alphabetical order.

Fig. 2 - Arrangement of specimens within the General Mycological Herbarium of Portici; A) Herbarium sheet labeled 2.62 (from package 2, folder 62), corresponding to *Trogia crispa* (= *Plicaturopsis crispa* (Pers.) D.A. Reid). Specimen labels are presented as handwritten or in form of printed labels including information such as collection date, location, collector's name, and, in some cases, details on the collection from which they were transferred. Several specimens bear the acquisition stamp "Acq.1928," indicating their incorporation during the management of the Herbarium by Trotter A. B) Dried specimen of *Polyporus frondosus* (= *Grifola frondosa* (Dicks.) Gray), collected in the Matese mountains near San Giuliano del Sannio by Nicola Pedicino. C) Sporocarps identified as *Cantharellus cibarius* by Comes O., collected in the Portici woods ("Parco Gussone"). D) Sporocarps belonging to the genus *Coprinus*, collector unknown. Due to the deliquescent nature of basidiomata in the genus *Coprinus*, the specimens were fixed on breathable paper supports.

This study focused on the first fifteen packages, which are dedicated to macromycetes, that are, fungi with visible sporophores, many of which are of ecological, toxicological, culinary, or forest

pathology interest (Fig. 1B). A total amount of 1742 specimens were attested for macrofungi. The remaining packages mainly contain cryptogamic material related to plant pathology will be the subject of future, more detailed studies. The specimens in the Herbarium consist of dry materials that are for a good portion entire basidiomata and ascomata. In the case of more fleshy or voluminous fungi, half longitudinally cut specimens are preserved instead of entire ones (Figs 3B, C). For more delicate, fragile, or deliquescent fungi, preservation was often achieved through dried sections or illustrations mounted on absorbent paper, intended to at least partially retain their key morphological characteristics (Figs 2D, 3A–C). The original organization of the Herbarium reflects a taxonomic structure based on "Flora Italica Cryptogama" (De Notaris and Baglietto, 1870).

Fig. 3 - Some particular case of specimens within the General Mycological Herbarium of Portici. Entire or longitudinally cut samples are fixed on paper support reporting identification and description of the specimens. A) Leaves from different plant species (Poplar, Salix, Oak) with fungal sporophores belonging to the genus *Typhula*. B) Longitudinal sections and reconstruction of single or tufted clusters of *Coprinellus micaceus* (Bull.) Vilgalys, Hopple & Jacq. Johnson. C) Sections of *Boletus* sect. *Edules*.

Provenance, contributors, and commercial collections

The geographical provenance of the specimens (Fig. 4) offers an overview of the breadth and variety of the Herbarium's sources. The majority of specimens originate from various Italian regions, with a marked concentration in the south, testifying to the active involvement of numerous mycologists in southern Italy. Many specimens come from the area around Naples; in these cases, only the collection sites are recorded, with no mention of the collectors' names, collection dates, or ecological context. Another substantial portion of the specimens come from the Calabria and the Gargano regions, through the collections of Giuseppe Antonio Pasquale, while a smaller number of samples originate from the Matese mountains, in the area where Pedicino N. was born. The Herbarium, particularly in

the part linked to Comes O.' contributions, includes fungi from De Notaris G.' fungarium, primarily focused on central and northern Italy (Comes, 1883).

Regarding Italian sources, Trotter A.'s contributions mainly include specimens from northern Italy, marking the end of mycological exploration in the southern parts of the peninsula. It is worth noting that both Comes O. and Trotter A. published studies on the fungal flora of the Campania region (Comes, 1878; Saccardo and Trotter, 1920). However, the species described in these publications are not represented in the Herbarium.

From an international perspective, contributions also come from other European areas, particularly France, Germany, Austria, and the Danube region, as well as from overseas collections acquired through international exchanges, such as those from South America by the Italo-Argentinian mycologist Carlo Luigi Spegazzini. This distribution reflects both direct collections by Comes O. and Trotter A., and contributions from academic collaborations and widely distributed exsiccatae series.

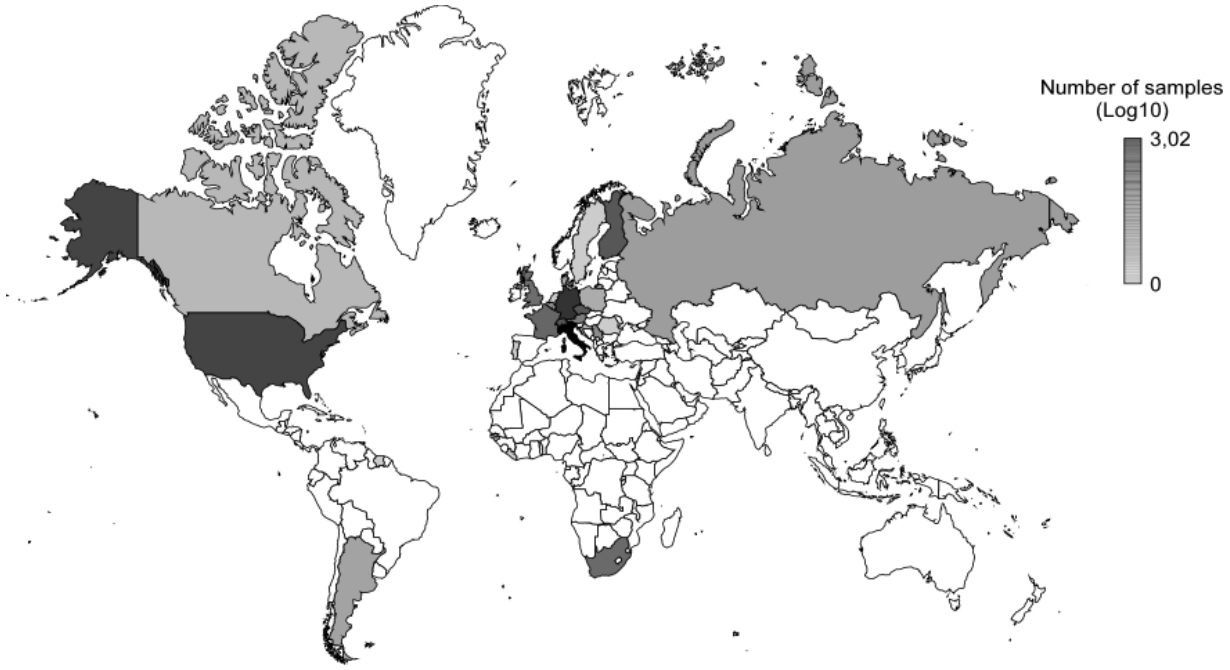

Fig. 4 - World map illustrating the provenance of mycological specimens in the Herbarium. Data were log10 transformed in order to reduce differences between maximum and minimum data.

The global geographical coverage of the specimens within the Herbarium reflects a wide network of collectors (i.e., attributions) with some contributing massively to the collection (Fig. 5A). The most significant number of specimens comes from Saccardo D., followed by other mycologists such as Cesati V., Alexander Kmet (whose collections, though from the late 19th century, were added to the Herbarium after 1928 thanks to collaboration with Saccardo D. (Saccardo, 1896), Andrea Fiori, and numerous other European and American collaborators. However, a significant portion of the specimens, especially those predating the acquisition date of Trotter in 1928, lack collector information.

Figure 5B shows the chronological distribution of the collections, highlighting two main peaks of activity. The first, between 1870 and 1882, corresponds to an intense period of mycological collection within Italy. Alongside Cesati V., the Herbarium includes specimens from other mycologists of that era such as De Notaris G. and Caldesi L. (Comes, 1883) renowned for their

mycological work, as well as figures better known for botanical studies, such as Pasquale G.A. and Pedicino N., who contributed samples from Calabria, the Gargano, and the inland areas of the Sannio and Matese regions. Many specimens likely attributable to Comes O. lack detailed information. Hypothetically some are tied to published works, such as his study on fungi from the Naples region (Comes, 1887).

The second peak, between 1890 and 1905, coincides with the systematic activity of Saccardo D. and a rise in accessions via exsiccatae, many of which would later be incorporated into the Herbarium beneath Trotter A.'s stewardship. After 1910, a decline in new acquisitions is observed, consistent with a shift from exploratory activity to archival work, or a diminished interest in macromycetes in favor of plant pathology, which increasingly drew Trotter A.'s attention. The shift from exploratory to archival work is also evident in the schematic organization of collections (Fig. 5A).

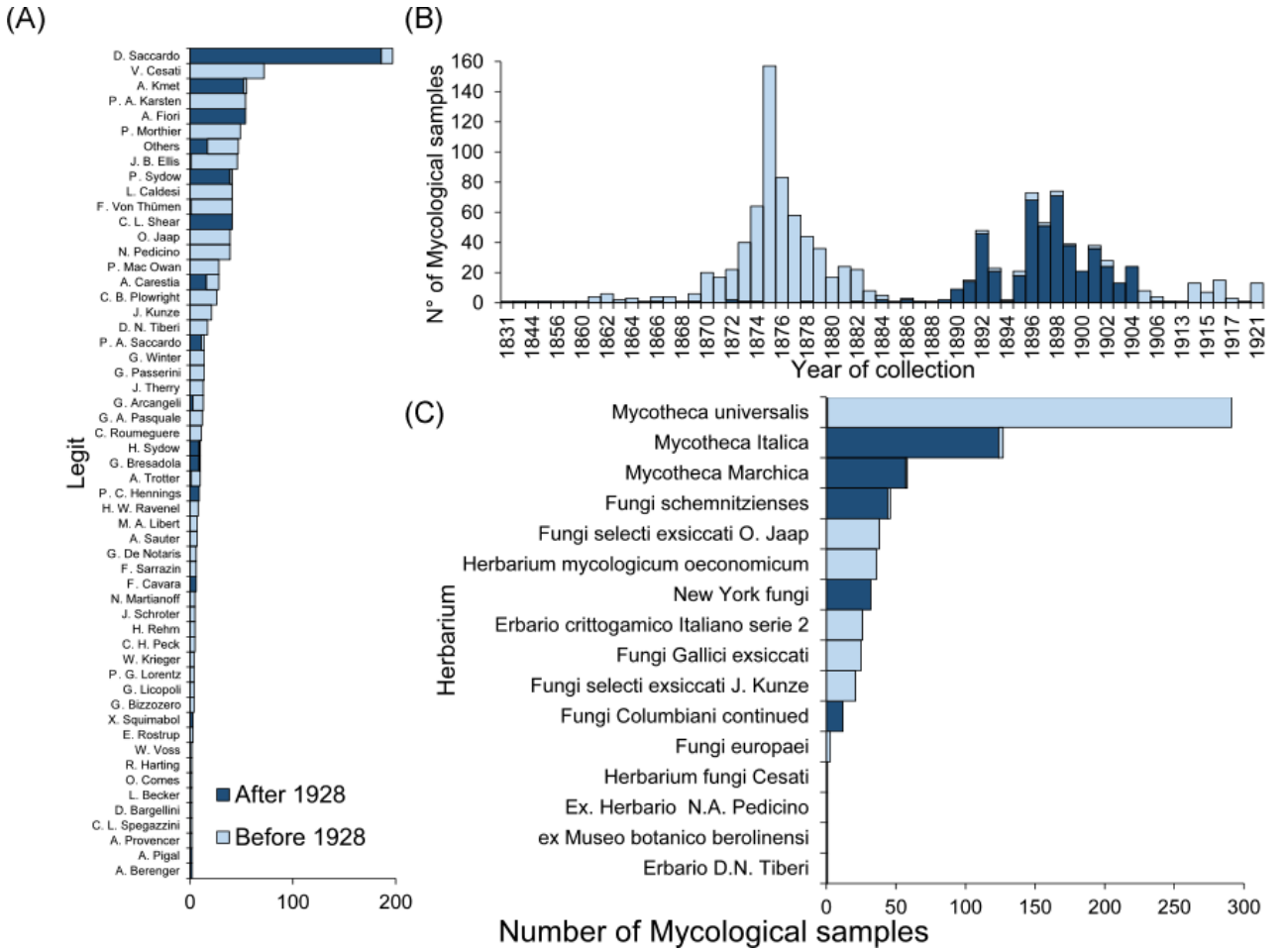

Fig. 5 - Histograms illustrating aspects of the history of the mycological specimens preserved in the General Herbarium of Portici. The three charts provide insights into: (A) the main collectors, (B) the chronology of collection, (C) the origins of the specimens. Each sample is classified according to whether it was already part of the Herbarium before 1928 (light blue) or was acquired later (dark blue), corresponding to the year of the herbarium's official foundation.

Like Comes O., Trotter A. also indirectly benefited from the extensive network of scientific contacts and collaborations maintained by his mentor and father-in-law Saccardo P. A. (Fig. 6). This included ties with the German mycologist Paul Sydow, from whom many specimens were obtained (Saccardo and Sydow, 1899). Some Herbarium accessions also stem from relationships established

by his brother-in-law, Saccardo D., as evidenced by material derived from his collaboration with Kmet A., described in "Contributo alla flora micologica di Schemnitz" (Saccardo, 1896). Published and purchasable fungarium are present across both phases. Notable series include "Mycotheca universalis" by Felix Von Thümen (Von Thümen, 1875), "Fungi selecti exsiccati" by Otto Jaap (Jaap, 1905), "Fungi selecti exsiccati" by Josh Kunze (Kunze, 1913), "Fungi columbiani continued" by Cornelius Lott Shear (Shear, 1924), "Mycotheca marchica" by Paul Sidow (Sydow, 1897), "Fungi schemitzienses" by Andrej Kmet (Kmet, 1900). and "Fungi gallici exsiccati" by Casimir Romeguèr (Romeguèr, 1885).

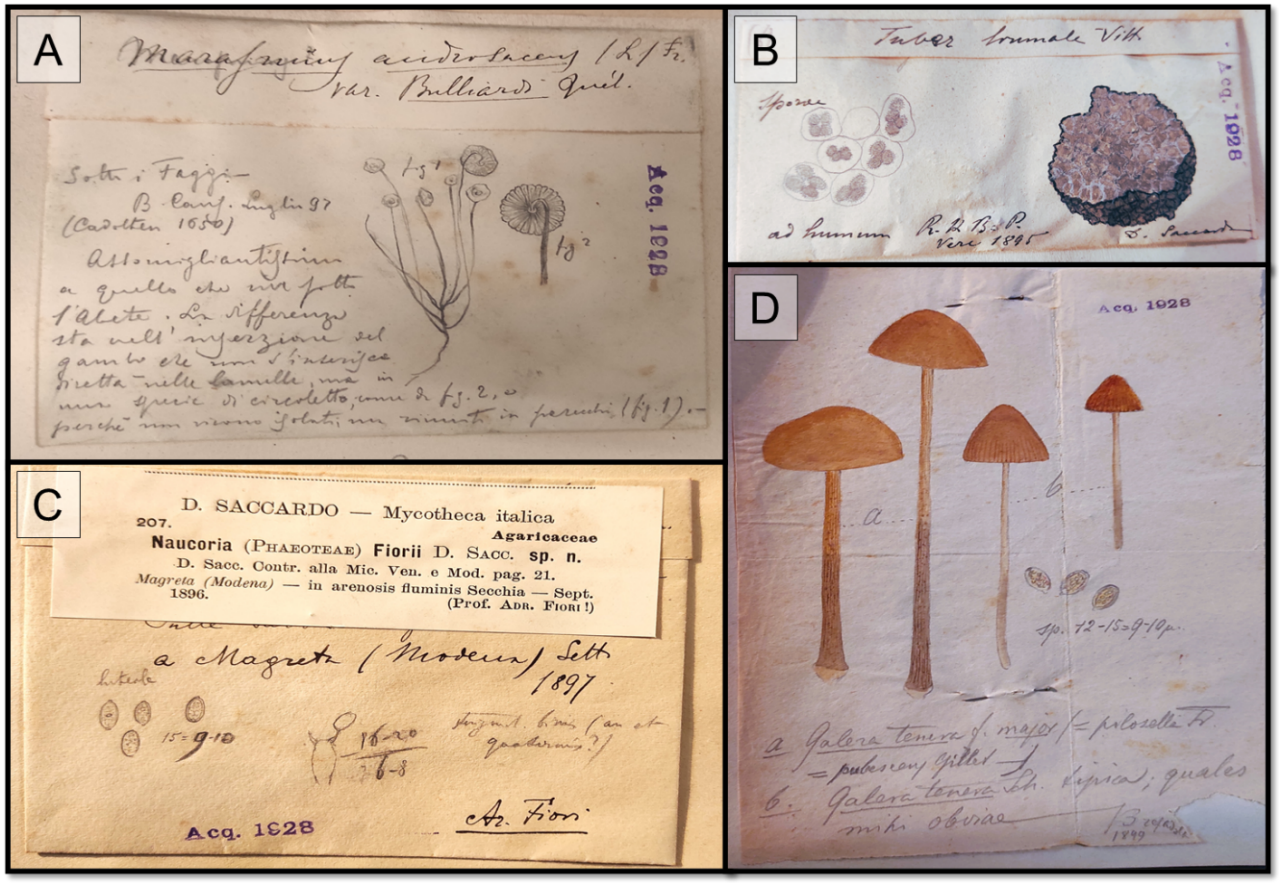

Fig. 6. Handwritten illustration on paper bags containing biological samples with details regarding microscopy analysis and general morphologies of the specimens. All the specimens in the picture have been integrated in the Herbarium after 1928 during Trotter stewardship and reflect the most representative contributors from 1890 to 1905. A) Specimen with pencil illustrations of *Marasmius androsaceus*= *Gymnopus androsaceus* (L.) Della Magg. & Trassin., signed by Saccardo D. B) Specimen of *Tuber brumale* Vittad. with pencil drawings of spores enclosed in asci, and a section of the truffle. Specimen originating from Saccardo D. C) Specimen from Fiori A. of the fungus named after him by Saccardo P.A., *Naucoria fiorii*= *Conocybe fiorii* (D. Sacc.) Watling, and included in Saccardo D.'s Mycotheca Italica. Note the microscopy notes on the bag, from which the presence of spore-bearing structures can be inferred, as well as the structure of a basidium, apparently bisporic. D) Illustration of *Galera tenera* = *Conocybe tenera* (Schaeff.) Kühner, signed by Bresadola G.

Taxonomic composition of the General Mycological Herbarium of Portici

Most of the specimens examined in this section of the Herbarium belong to the Basidiomycota (98%), while only a small fraction (2%) is attributed to the Ascomycota. The marked disparity is primarily due to the natural tendency of Basidiomycota to form large, conspicuous fruiting bodies. As the present analysis was limited to macromycetes, this outcome is plausible. Notably, the Ascomycota

specimens identified were all hypogeous fungi, preserved in an unnumbered package. It is possible that further analysis of the remaining portions of the Herbarium could reveal additional non-hypogeous macromycetes belonging to the Ascomycota.

When analyzed at family level data reveal a predominance of certain taxa. Notably, Agaricaceae (34%), Polyporaceae, and Telephoraceae (23%) constitute the majority of catalogued specimens. Other, less represented families include Hydnaceae (6%), Lycoperdaceae and Clavariaceae (4%), Tremellaceae, Sclerodermataceae, and Tuberaceae (2%), as well as Auriculariaceae, Nidulariaceae, Dacrymycetaceae, and Hymenogasteraceae (1%). Families with only a few or isolated specimens include Tulasnellaceae, Secotiaceae, Myriangiaceae, Phallaceae, and Elaphomycetaceae (Fig. 7). Although less numerous, these families remain significant in terms of the overall diversity of the Herbarium.

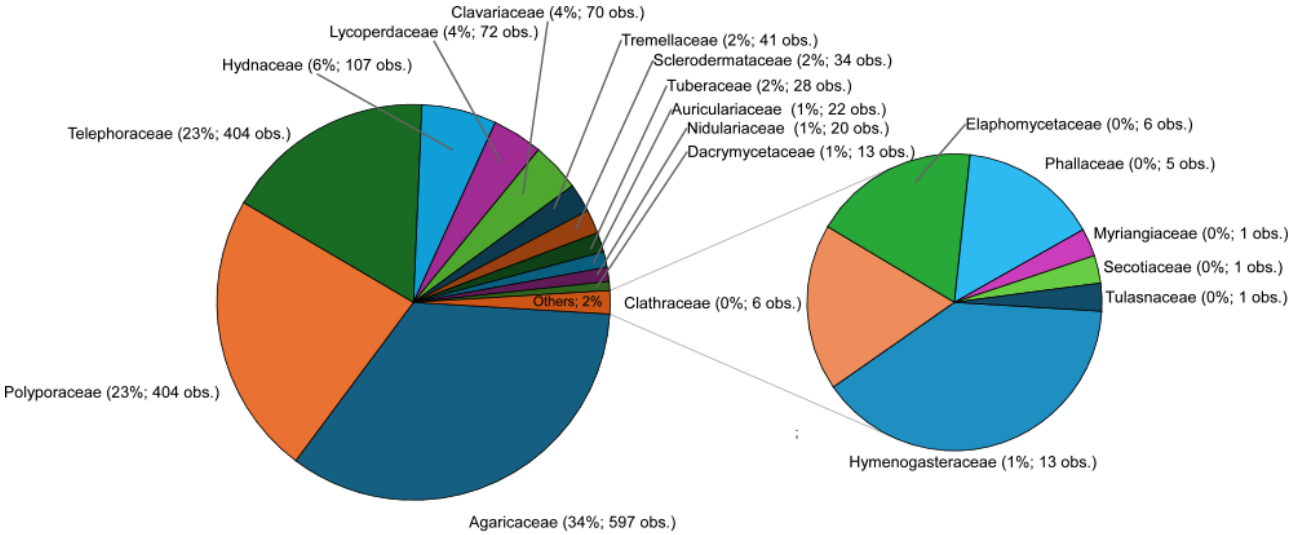

Fig. 7 - Pie charts illustrating the taxonomic composition at family level of the General Mycological Herbarium of Portici, based on the total number of catalogued specimens.

A comparison between the classification system presented in the Herbarium and the current one highlights substantial shifts: the number of species decreases from 809 to 682, while the number of genera increase from 135 to 316. This change reflects the evolution of fungal taxonomy towards phylogenetic models based on molecular data, which has led to the redefinition of numerous taxa and the reorganization of previous systematic groupings. Although these updates have not been applied to the Herbarium's physical organization, it underscored its value as a record of the development of mycological knowledge. The Figure 8 further reflects historical taxonomic approaches that emphasized morphological features such as spore structures, hymenophores, and tissue consistency. In this sense, the internal organization of the Herbarium, though rooted in historical classification, serves as a useful reference point for comparing current mycological systematics. Indeed, when broken down by order (Fig. 8A), for the portion of the Herbarium dedicated to macromycetes, specimens are grouped into five major taxonomic orders. The most represented is Hymeniales (86%; 1,474 observations), which at the time of Comes O. and Trotter A. was defined by the presence of hymenial structures with distinct morphological arrangements for spore dispersal. This order was considered including Basidiomycetous fungi that were generally fleshy, conspicuous, ranging from corky to membranous, terrestrial or lignicolous. Morphologically distinguished by microscopic structures such as basidia, sometimes accompanied by cystidia, and ovoid, globose, oblong, or

variously colored spores. Today, the term Hymeniales has largely fallen out of use and has but still refers to those macromycetes forming lamellar (e.g., gilled mushrooms), poroid, and tubular hymenia.

The second most represented order is Geasterales (8%; 140 observations), characterized by basidiospores produced within an enclosed fruiting body, referred to, at the time, as the *utero* or *receptacle*, which assumes various forms among taxa from globose and pyriform to stipitate, capitate, and even crateriform in aged specimens. The hymenium of these basidiomata were considered enclosed by layers of sterile hyphae forming the peridium, while the fertile spore-bearing part inside is called the gleba or flesh.

Less represented are the Tremelloidales (2%; 41 observations). Members of this order were recognized by typical gelatinous fruiting bodies, a structure composed of branched and gelatinized hyphae, longitudinally septate basidia, and globose or ellipsoid basidiospores with smooth or finely verrucose surface. Equally scarce are the Phalloidales (2%; 33 observations), recognized by their fruiting bodies, which originate from a juvenile phase enclosed in a membranous volva, and developing a central stalk supporting a gleba, with a spongy or pseudoparenchymatous texture. These produce a fetid, mucilaginous gleba hosting embedded tetrasporic basidia and hyaline, smooth, ellipsoid spores. For these three latter taxonomic groups, the Herbarium's organization does not follow the classification detailed in fascicle 15 of "Flora italica cryptogama" by Saccardo P.A. Instead, the nomenclature aligns with a provisional classification based on a revised terminology proposed by Saccardo P.A. and Traverso G.B. (Kellerman 1907), later abandoned by Saccardo himself in "Sylloge fungorum".

Finally, the Tuberales (2%; 35 observations), a taxon proposed by Barthélemy Charles Joseph Dumortier in "Analyse des familles de plantes: avec l'indication des principaux genres qui s'y rattachent" (Dumortier, 1829) and widely adopted at the time, was defined to include all solid ascomata with gleba interspersed with veins, voids, or fully solid tissues, which never disintegrate into a spore powder at maturity. These fungi are usually hypogeous, occasionally sub-hypogeous. The group remained in use until 1971, when Trappe proposed its abandonment; as he suggested that the evolution of the hypogeous form was more likely the result of convergent evolution among polyphyletic taxa (Trappe, 1971).

Despite the most updated taxonomical classification of the "Sylloge fungorum" during Trotter's curatorship (Saccardo et al., 1882–1931), the Herbarium remained organized according to the framework of "Flora italica cryptogama" (Saccardo, 1915). Thus, Agaricaceae continued to be grouped based on their characteristic lamellar hymenium. This classification also included genera that today would not fall under lamellar hymenia, such as *Cantharellus*. Similarly, the Polyporaceae, another prominently represented group, encompassed all sporophores with poroid hymenia, which now belong to distinct families such as Boletaceae.

Focusing on Hymeniales and Agaricaceae, which represent the most substantial portion of the Herbarium (Fig. 8C), further classification is based on the color of the mature spore print. The specimens are grouped into five categories:

- Leucosporeae (white): 94%
- Ochraceosporeae (yellow-brown): 18%
- Melanosporeae (dark brown/blackish): 10%
- Ianthinosporeae (violet): 7%
- Rhodosporeae (pink): 1%

This color-based classification was a fundamental tool in traditional dichotomous keys, used to differentiate genera and define the internal structure of large families such as Agaricaceae.

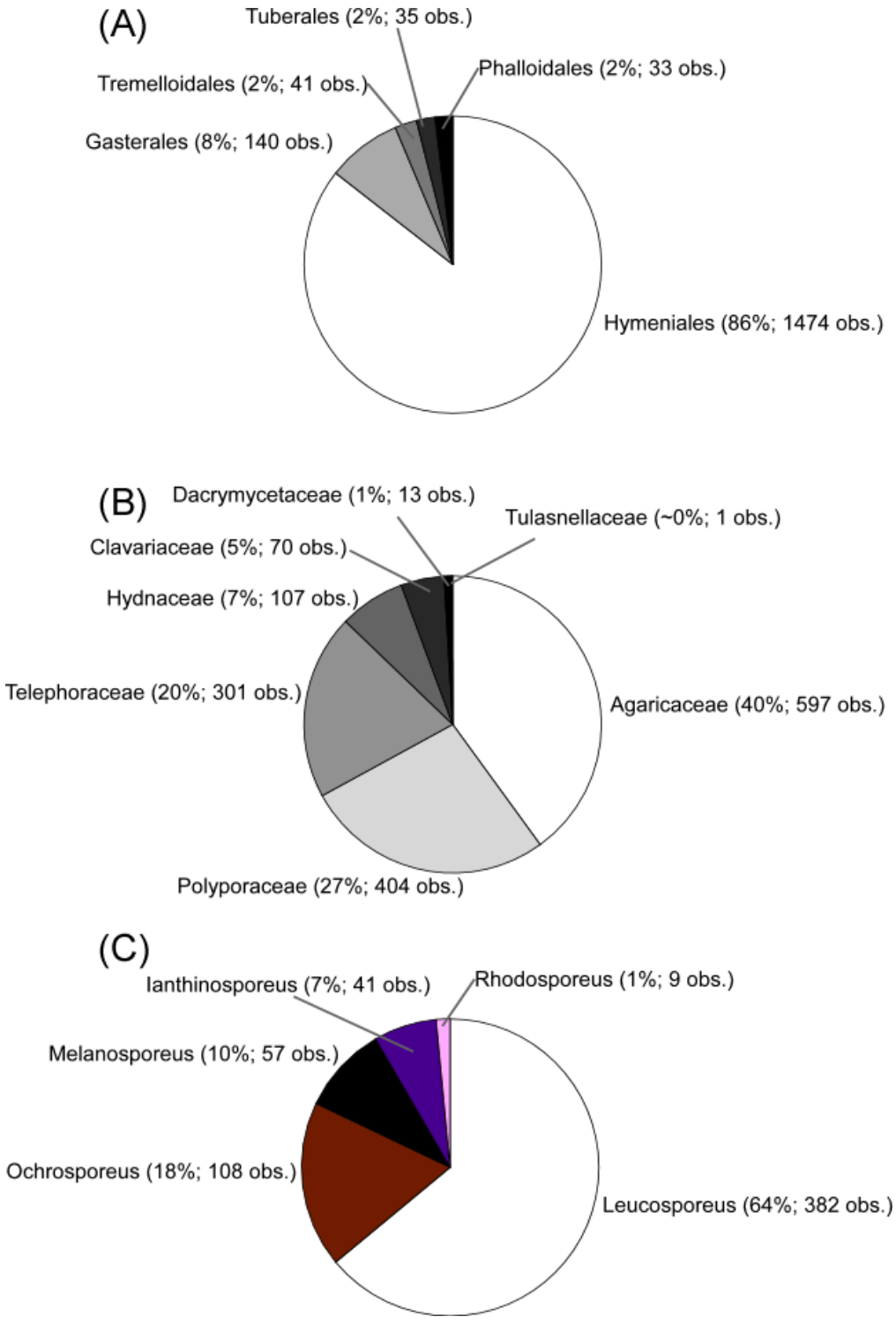

Fig. 8 - The classification system adopted in the General Mycological Herbarium and relative abundance for each taxonomic level calculated as percentage on the total amount of specimens with a special focus on Hymeniales and Agaricaceae. A) Classification at the level of orders, based on the visible features of the sporophores. The order Hymeniales dominates the collection, comprising 86% of all specimens. B) Focus of the dominant order, Hymeniales, displaying the distribution of its specimens by family. C) Macroscopic characters in traditional mushroom taxonomy: spore print color, within the family Agaricaceae.

Conclusion

The General Mycological Herbarium of the Museum of Agricultural Sciences in Portici represents a historical and scientific heritage of extraordinary relevance, not only for the richness and variety of its contents, but also because it documents a complex picture of academic activities, collaborative networks, and mycological research methodologies in the 19th and 20th centuries. The section dedicated to macromycetes, in particular, serves as a crucial resource for the study of fungal biodiversity and its historical perception, as well as a tangible testament to the evolution of botanical science and agricultural education in southern Italy. A systematic evaluation of the conservation status, along with the digitization of the collection, appears essential today to ensure both the preservation of the material and its accessibility to the national and international scientific community. Even larger and historically significant herbaria, such as Saccardo P.A.'s fungarium in Padua, rich in type specimens and central to the history of fungal classification, remain undigitized today, with their contents preserved only in printed form (Gola, 1930). This highlights the need for a consistent research effort aimed at reconstructing the history of Italian mycology and its crucial contribution to fungal systematics.

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