CHAPTER 2

LITERATURE REVIEW

2.1 Definitions and Biological Roles of Fungi

The term 'fungi' refers to a diverse assemblage of eukaryotic organisms (Paulus, 2006) in which the genome is organized in a nucleus surrounded by a membrane (de Hoog *et al*., 2000). The fungi (the majority of 'true fungi') have primarily been placed in the Kingdom Eukaryota, with the exception of some belonging in the Kingdom Chromista and Protoctista (Paulus, 2006). Fungi later are then treated as a separate kingdom, Kingdom Fungi (Moncalvo, 2005), represent living organisms which are heterotrophic, lacking chlorophyll, and are dependent on organic carbon compound for their nutrition. The major cell wall constituents are β-glucans (1,3 β-, 1,6 β-glucan) and chitin (Adams, 2004), exceptionally other macromolecules such as cellulose or chitosan are present (de Hoog *et al*., 2000). Members of the Kingdom Fungi are currently restricted to four divisions: the Ascomycota, Basidiomycota, Chytridiomycota and Zygomycota (de Hoog *et al*., 2000; Kirk *et al*., 2001).

Fungi are not only some of the most important organisms in this world, but are also the most poorly studied. Totally 1.5 million species have been estimated to occur worldwide (Hawksworth, 1991; 2001; Kirk *et al*., 2001), but to date, only 80,060 species have been described (Promputtha, 2006). Estimation of species numbers has been carried out by extrapolating from the numbers of vascular plant species

(Rodríguez, 2000) and ranges from around 100,000 (Ainsworth and Bisby, 1943) to 9.9 million (Hawksworth, 1991; 2001; Cannon, 1997). While such approximations are open to debate, they all suggest that much of the species diversity is in the tropics and remains to be discovered (Dreyfuss and Chapela, 1994; Fröhlich and Hyde, 1999; Arnold *et al*., 2000: see Table 2.1).

Table 2.1 Approximate numbers of fungi (including slimemolds, lichen-forming fungi, straminipilous fungi and yeasts) and plants[a] (seed plants and ferns) known from different regions of the world (Hawksworth and Mueller, 2005).

Region	Described species	Estimated total species	Percentage unknown
Asia	20,000 (70,000)	600,000 (77,000)	>95 (10)
Europe	25,000 (12,000)	65,000 (12,000)	60 (>1)
Africa	10,000 (60,000)	450,000 (67,000)	>95 (10)
North America	21,000 (18,000)	250,000 (18,000)	>90 (1)
Central and South America	10,000 (85,000)	500,000 (100,000)	>95 (15)
Oceania	6,000 (17,000)	250,000 (21,000)	>95 (20)
Antarctica	750 (2)	1,750 (2)	55 (0)
Global	72,000	1,470,000	95

[a] Plant figures are in parentheses

Adapted from Rodriguez (2000)

Source: Table 2.3 (Hawksworth and Mueller, 2005)

Fungi play an integral role in ecosystem processes (see Table 2.2), e.g., nutrient cycling, plant growth, and sensitivity to air pollution. They are economically important, e.g., as plant (Agrios, 2005) and animal pathogens; as a food source; in food spoilage; and in biodeterioration (Alexopoulos *et al*., 1996; Dighton, 2003) and

they also have a huge potential in the agricultural, biotechnological, pharmaceutical and health care industries (Alexopoulos *et al*., 1996; Hyde, 1997). The biological roles of fungi have been adequately discussed in several papers (e.g. Went and Stark, 1968; Carroll and Wicklow, 1992; Alexopoulos *et al*., 1996, Bennett, 1998; Guest and Smith, 2002, Steiner *et al*, 2002, Santana *et al*., 2006).

Table 2.2 Ecosystem services provided by fungi (Dighton, 2003)

	Ecosystem service	Fungal functional group
Soil formation	Rock dissolution	Lichens, Saprotrophs, Mycorrhizae
	Particle binding	Saprotrophs, Mycorrhizae
Providing fertility for primary production	Decomposition or organic residues	Saprotrophs (Ericoid and ectomycorrhizae)
	Nutrient mineralization	Saprotrophs (Ericoid and ectomycorrhizae)
	Soil stability (aggregates)	Saprotrophs, Arbuscular mycorrhizae
Primary production	Direct production	Lichens
	Nutrient accessibility	Mycorrhizae
	Plant yield	Mycorrhizae, Pathogens
	Defense against pathogens	Mycorrhizae, Endophytes, Saprotrophs
	Defense against herbivory	Endophytes
Plant community structure	Plant-plant interactions	Mycorrhizae, Pathogens
Secondary production	As a food source	Saprotrophs, Mycorrhizae
	Population/biomass regulation	Saprotrophs, Mycorrhizae, Pathogens
Modification of pollutants		Saprotrophs, Mycorrhizae
Carbon sequestration and storage		Mycorrhizae (Saprotrophs)

Source: Table 1.1 (Dighton, 2003)

2.2 Definition and Biological Role of Saprobic Fungi

The overlapping definition for a saprobe given in Hawksworth *et al*. (1995) and Kirk *et al*. (2001) in the "Dictionary of the Fungi (8^{th} edition and 9^{th} edition, respectively) stated that "a saprobe is an organism that derives its nutrition from the dead remains of other organisms, e.g. plants and animals, and commonly causes decay". The most important role of fungal saprobes is in the decomposer of organic matter (Table 2.3). Fungi can degrade complex structural materials such as wood and insect cuticles by producing various enzymes (Techa, 2001), these enzymes are excreted into the substrate and the mycelium subsequently take-up digested compounds through their cell wall (de Hoog *et al*., 2000). Saprobic fungi usually live on dead vegetable matter (sticks, leaves, logs), as they are the only multi-celled organisms that can digest both cellulose and lignin, the two major components of wood (and, in fact, the two major components of plants' cell walls in general). The most important saprobic fungi in the ecosystem are basidiomycetes, especially white rot fungi, but also some of hyphomycetes (e.g *Aspergillus fumigatus*, *Coriolus versicolor*, *Gleoporus dichrous*, *Lentinus edodes*, *Polyporus abientinus* and *Polyporus hirsutus*). The degradative ability of saprobic fungi is very important in ecosystems as they can decay large or small pieces of dead organic matter and enhance humus synthesis and bring about nutrient cycling.

Table 2.3 Principle functions of saprobic fungi in ecosystems (Modified from Tsui, 1999 and Christensen, 1989).

1. Decomposition of organic matter. This involves the volatilization of C, H and O, reduction in volume, fragmentation, increase in homogenecity, and assimilation by microbes and detritus feeders.
2. Elemental release. The minaeralization of N, P, K, S and other ions from organic and inorganic materials commonly accompanies decomposition.
3. Modification of soil permeability and promotion of aggregation.
4. Modification of soil ionic exchange and water holding capacities.
5. Detoxification of soil. This function is a derivatives of chemical or physical alternation e.g., degradation, volatilization, or sequestering.
6. Synthesis of humic substances.
7. Participation in saprophytic food chains.
8. Production of environmental biochemicals e.g., antibiotics, immunosuppressants.
9. Cultivation for enzymes or food.
10. Being the bioindicator of air pollution.

2.3 Life Strategies of Saprobes

Substrates for fungal growth may be living or non-living. Fungi can be divided into three categories according to their nutritional mode; parasitic, endophytic or saprobic. An important factor affecting the distribution and life-styles of fungi is their heterotrophy; all growth requires utilization of organic compounds (Cooke and Rayner, 1984). Different fungi vary widely in their ability to gain access to and utilize different carbon sources. This variation affects many aspects of their behavior, which includes their patterns of establishment in natural nutrient sources, their inter-relationships with other organisms, and the types of material which they can occupy (Cooke and Rayner, 1984; Kendrick, 2000; Dix and Webster, 1995). Parasities are an organism living on or in, and obtaining its nutrients from, another living organism (Kirk *et al*., 2001), This category includes ‘pathogens’ - a parasite living in another

living organism, obtaining nutrients from it and being harmful to the organism (the host) by causing diseases (Raven *et al*., 1992). An endophyte is an organism living in healthy plant tissue but causing symtompless infection (Petrini, 1991). A saprobe is an organism that utilizes non-living organic material as food, commonly causing its decay (Hawksworth *et al*., 1983; Cooke and Rayner, 1984; Dix and Webster, 1995). However, studies of endophytes have showed that they can switch between one mode of nutrition and another during their life cycle (Boddy and Griffith, 1989; Fisher and Petrini, 1992; Sridhar and Raviraja, 1995), thus utilizing both living and dead tissue.

2.4 Ecology of Saprobic Fungi

Several saprobic fungi have been examined on dead plant tissues of several plant species in different geographical regions worldwide (Table 2.4).

2.5 Litter Fungi

Fungal diversity assessments have been carried out worldwide on various plant substrata, e.g. bamboo, leaf litter, palms, wood and submerged wood (Fröhlich, 1997; Dalisay, 1998; Taylor, 1999; Tsui, 1999; Yanna *et al*., 2001; Parungao *et al*., 2002). Tropical rainforests comprise a great variety of tree species that produce high amounts of leaf litter (Cooke and Rayner, 1984). Few investigators, however, have attempted to measure the abundance in the diversity of microfungi species inhabiting tropical leaf litter (Bills and Polishook, 1994, Promputtha *et al*., 2002, 2004a, b, c). Decomposers are stratified within the forest floor, with some species colonizing only fresh litter and others restricted to soil organic matter (Lodge and Cantrell, 1995). Parungao *et al*. (2002) studied the diversity of fungi on rainforest litter in

Table 2.4 Recent studies on saprobic fungi on several tropical dead plant tissues (from year 2003 to year 2006).

Plant species	Litter	Sites	References
Bambusicola	Bamboo culms	Yunnan, China	Cai *et al*., 2003c; 2004a, b, 2005b; 2006d; Zhou *et al*., 2003
Calamus sp.	Decayed fronds	Daintree National Park, Cape Tribulation	Bahl *et al*., 2005
Castanopsis diversifolia	leaves	Chiang Mai, Thailand	Duong *et al.,* 2004
Castanopsis fissa	leave	Mount Nicholson, Hong Kong	Tang *et al*., 2005
Elaeocarpus angustifolius	leaves	North Queensland, Australia	Paulus *et al*., 2003
Eleiodoxa conferta	dead petioles and rhachides	Sirindhorn Peat Swamp Forest, Narathiwat, Thailand	Pinnoi *et al*., 2003a, b; 2004
Ficus pleurocarpa	leaves	North Queensland, Australia	Paulus *et al*., 2006
Indocalamus sp.	Bamboo culms	Shing Mun Country Park, Hong Kong	Shenoy *et al*., 2005
Licuala longecalycata	decaying trunks and sheaths	Sirindhorn Peat Swamp Forest, Narathiwat, Thailand	Pinruan *et al*., 2004a, b, c; 2007
Magnolia liliifera	leaves	Chiang Mai, Thailand	Promputtha *et al*., 2002, 2004a, b, c
Manglietia garrettii	Woody litter	Chiang Mai, Thailand	Kodsueb *et al*., 2006c
Michelia baillonii	Woody litter	Chiang Mai, Thailand	Kodsueb *et al*., 2006c; 2007b
Musa acuminata	Leaves?	Chiang Mai, Thailand	Photita *et al*., 2002; 2003a, b
Nenga pumila	dead petioles and rhachides	Sirindhorn Peat Swamp Forest, Narathiwat, Thailand	Pinnoi *et al*., 2003a, b, 2004
Pandanus sp.	leaves	Chiang Mai, Thailand	Thongkantha *et al*., 2003
Pennisetum purpureum	stem	Chiang Mai, Thailand	Bhilabutra *et al*., pers. comm.
Psychotria asiatica	fruit	Hong Kong	Tang *et al*., 2003

North Queensland, and found 57 taxa comprising 18 ascomycetes and 39 anamorphic fungi from 13 different leaf types. They identified 2–3 unique fungi from each leaf species, with overlap in only 40% of species. Their evidence suggests that litter fungi are less ubiquitous than originally thought, but further work with good statistical analysis is required to confirm this.

Wood has advantages as a substratum for studying community dynamics (Boddy, 1986). Wood decomposition in temperate terrestrial ecosystems is brought about largely by fungi since, by comparison with unicellular micro-organism, the mycelial form adopted by most fungi is specially suitable for invasion of solid, bulky, spatially determinate resource units. Details of the capacity of microorganisms to decay wood are given elsewhere. Basidiomycetes are reported as the major agents of wood decomposer.

Recently, the biodiversity and ecology of fungi on leaf litter in Thailand has been studied (Promputtha, 2002, 2004a, b, c, 2005b; Duong, 2006; Thongkantha, 2006). Thirty-seven collections of saprobic fungi were identified from leaf litter of *Magnolia liliifera* in northern Thailand (Promputtha, 2002). They comprised 20 ascomycetes and 17 anamorphic taxa (13 hyphomycetes and 4 coelomycetes). Some authors consider that because Thailand is in the tropics, the saprobes and pathogens should be highly diverse (Dreyfuss and Petrini, 1984; Hyde, 2000).

2.6 Fungal Succession

Fungal succession is a time-related change in fungal community structure (Dix and Webster, 1995). In other words, fungal succession is a study of the changes in the structure of fungal communities on various substrata over time (Yanna, 1997). Rayner

and Todd (1979) defined the definition of succession as “the sequential occupation of the same site by thalli (normally mycelia) either of different fungi or different associations of fungi”. Saprobic fungal succession can be classified as serial succession or substratum succession. Substratum succession refers to the succession of species that occur on any colonisable plant, animal or man-made material (Cooke, 1979; Frankland, 1992). The occurrence of different fungal taxa at different stages of decomposition on decaying materials is serial succession. After fungi colonize a substrate, their presence can be detected by loss in strength and changes in color (Yanna, 1997). Species diversity tends to be richest and number of fungi usually highest during the early stage of colonization (Dix and Webster, 1995), then species numbers begin to decline.The subject of fungal succession has been reviewed by Frankland (1992, 1998). There have been numerous studies of fungal succession in temperate regions (e.g. Dickinson, 1967; Frankland, 1969, 1992). There have also been several studies of succession of fungi on degrading cellulosic substrates (Webster, 1956; Gorska, 1982; Tokumasu, 1998). Recently, Hyde and Jones (2002) edited a book devoted to fungal succession, which includes 16 papers dealing with various aspects of fungal succession. This volume also includes 11 papers presenting studies on succession of microfungi on various decaying substratums in both temperate and tropical regions. In all of these studies, a sequential occurrence of fungi was observed. In general, fungal communities were classified into three succession stages (Dix and Webster, 1995), the pioneer stage, the mature stage and the impoverished stage. Other authors have used the terms pioneer, early and later successional groups, which may be considered the same (Promputtha *et al*., 2002). Dix and Webster (1995) also found that pioneer communities are typically composed

of a large number of different species occurring in low frequency with no obvious dominant species. While mature communities consist of fewer species with one or two obvious dominant species common to all samples at similar stages in the development of the fungal community (Yanna, 1997). In practice, fungal succession on decomposing organic matter are rarely followed to this end-point, and investigations of the fungal decay of the refractory remains of plants within soil have been limited (Frankland, 1992).

Numerous substratum succession by saprobic fungi have been described, mostly from plant material above the soil (Dickinson and Pugh, 1974) and their general characteristics have been compared by Hudson (1968), Frankland (1981), Swift (1982) and Cooke and Rayner (1984). In Thailand, the pioneer work of fungal succession was reported from *Magnolia liliifera* leaf litter (Promputtha *et al.*, 2002). Other researchers have been working on fungal succession on other plants, i.e. *Castanopsis diversifolia* (Duong, 2006), *Magnolia liliifera* (Promputtha *et al*., 2002, Kodsueb *et al*., this thesis), *Meliosma simplicifolia* (Promputtha, 2006) and *Pandanus* sp. (Thongkantha, 2006).

2.7 Woody Litter

Woody tissue is the most abundant natural substrate available for the growth of fungi. Woody substrates colonized include terrestrial wood, driftwood, intertidal wood, and permanently submerged wood (Vrijmoed, 2000). Wood is a heterogenous polymer consisting mainly of the polysaccharide cellulose and hemicellulose plus a polyphenolic lignin component (Fengel and Wegener, 1989). These components

together form the most abundant biomaterial in nature and so studies of their degradation and colonization are important ecologically (Hyde *et al*., 1998b).

Cellulose is the main constituent of wood with approximately 40-50% of the dry weight of all wood species (Rayner and Boddy, 1988). It is located predominantly in the secondary cell wall and least abundantly in the compound middle lamella (Yuen, 1998). Cellulose comprises a long and linear homopolymer of β-D-glucose residues connected by β-1,4 glycosidic linkages. The structural properties in the cell wall and many physical and chemical properties of wood were controlled by the hydroxyl group at the surface of the cellulose molecules (Zabel and Morrell, 1992).

Hemicellulose is composed of heteropolysaccharides. The dry weight of hemicellulose in wood is between 20-30% (Yuen, 1998). Its polymers comprise various pentose and hexose sugar units, i.e. glucose, xylose, mannose, galactose, arabinose, rhamnose and uronic acids (Eriksson *et al*., 1990). In contrast with cellulose, hemicellulose has short chain lengths, side chains that are sometimes branched and sugar monomers other than glucose (Yuen, 1998).

Lignin is the most complex compound in the cell wall constituents that limit microbial growth and retard wood decay. Lignin coats the cell wall polysaccharides and chemically combines with them to form lignocellulose, which is very resistant to microbial degradation, being a poly phenolic polymer formed from three types of phenyl propane units (Yuen, 1998). Next to cellulose, lignin is the most important renewable resource in the ecosystem (as wood component). Lignin is present in the middle lamella and primary wall. It forms a barrier that must be degraded before most cellulose is accessible to enzymes. Lignin-degrading enzymes are found in fungi that cause soft rot, white rot and brown rot (Rayner and Boddy, 1988).

2.8 Freshwater fungi

Freshwater fungi are any species relying on free freshwater for some part of their life cycle, or any species colonizing substrates that are predominantly aquatic or semi-aquatic in nature. In other words, their habitats may be clearly of an aquatic nature or they may colonize submerged plant parts in freshwater environments (Thomas, 1996). Hence, freshwater fungi are an ubiquitous and diverse group of organisms (Goh and Hyde, 1996). Freshwater fungi are an ecological group and comprise all major taxa; ascomycetes, basidiomycetes, coelomycetes, hyphomycetes, trichomycetes, Zygomycota, *Chitridiales* and chromista (Sivichai and Boonyene, 2004). Several previous examinations of freshwater fungi in the tropics and sub-tropics have yielded numerous fungi including zoosporic fungi, basidiomycetes, zygomycetes, tricomycetes (Goh and Hyde, 1996), hyphomycetes (Wood-Eggenschwiler and Bärlocher, 1985; Goh and Hyde, 1996; Goh *et al.*, 1997), coelomycetes (Goh and Hyde, 1996) and ascomycetes (Magnes and Hafellner, 1991; Udaiyan and Hosagoudar, 1991; Shearer, 1993; Goh and Hyde, 1996; Shearer *et al*., 1999; Cai *et al*., 2002). The main role of higher fungi in freshwater ecosystems is in the degradation of dead plant material and woody material that find their way into the water. The decay of dead plant tissues is a result of the ability of the fungi to degrade lignocellulose. The success of freshwater fungi in colonizing submerged woody material lies in their ability to form soft-rot cavities and to be antagonistic against other fungi (Goh and Hyde, 1996).

Sivichai and Boonyene (2004) have concluded that fungi which are found in freshwater habitats can be grouped into three categories according to their morphology and ability to degrade substrata in the environment:

Group 1. Ingoldian fungi: used in a broad sense for anamorphs of ascomycetes and basidiomycetes, with tetraradiate, branched or sigmoid conidia and occurring on decaying leaves.

Group 2. Ascomycota and non-Ingoldian hyphomycetes occurring mostly on submerged wood material and having ability to degrade lignocellulose.

Group 3. Chromista (Stramenopiles), mainly zoosporic organisms. These fungi have no ability to degrade cellulose.

Dead wood is an essential component of stream ecosystems (Triska and Cromack, 1980). Fallen tree trunks, branches and twigs regulate stream dynamics by increasing the retention of organic matter, and provide habitats for a large number of organisms, including fungi, insects and even fish (Tsui *et al*., 2000).

Ho *et al*., (2001) concluded that woody debris plays an important functional role in stream ecology, producing sources of carbon and energy, influencing stream channel morphology, increasing habitat diversity, and providing sites of attachment for aquatic organisms (Bärlocher and Kendrick, 1976; Anderson and Sedell, 1979; Bilby and Likens, 1980; Harmon *et al*., 1986). The episodic input, the bulkiness which resists displacement by water flow, and the long durability of woody debris explain its importance to freshwater fungi as a site for long-term inhabitance, for sexual and asexual reproduction and competition, and as vehicles for long distance dispersal (Shearer, 1992).

2.9 Molecular techniques for fungal studies

The fundamental goal of fungal systematics is to establish the evolutionary history of the fungal kingdom and establish relationships among different taxa

(Ranghoo, 1998). The traditional key for species identification was proposed by Carolus Linnaeus in 1735 and has been accepted as the binomial nomenclature which is mainly based upon morphological and biological characters. This system, however, was considered several limitations. Generally, one major obstacle for fungal identification is the difficulty in implementing the recognition criteria of homology working with morphology at higher taxonomic levels (Morales *et al*., 1995). This particularly occurs when these characters are highly variable and few in numbers when compared to the large number of species described (Morales *et al*., 1995).

With the development of molecular techniques, the problem of homology has decreased (Berres *et al*., 1995). Molecular biology is now widely used in fungal systematics because it can clarify the relationship among taxa which can not delineate using morphological characters. *Fusarium*, is a very complicated genus to identify since morphologically species very similar in appearance. Brayford (1996) suggested that the use of DNA sequencing is the ultimate means to assess the phylogeny of *Fusarium*.

From the last dcade, molecular biology has developed rapidly with a variety of techniques which are now available to mycologists to help understanding the phylogenetic relationships of species and genera and concepts at higher taxonomic levels. Traditionally taxonomy and identification of all living organisms has depended on morphological characters. However, modern molecular methods are now being used to detect cryptic species, separate closely related species, and determine phylogenies. Within the fungi, where morphological characters are limited, molecular techniques are proving very useful. Nowadays, there are many techniques used in fungal studies and molecular tools utilize ITS rDNA, small and large subunit rDNA,

β-tubulin and histone gene sequences are now established to prove fungal taxonomy and classification (Câmara *et al*., 2001; Jeewon, 2001, Roux *et al.,* 2001; Jeewon *et al*., 2002, 2003, 2004; Photita, 2005; Bahl *et al*., 2005; Bussaban *et al*. 2005; Cai *et al*., 2005a, 2006c; Promputtha *et al*., 2005; Kodsueb *et al*., 2006a, b; 2007a; Tang *et al*., 2006, 2007, Shenoy *et al*., 2006). Molecular techniques are not only used to illustrate the complexity of fungal taxonomy, but mycologists also use them to compare genetic materials and draw conclusions about the relatedness of taxa. Molecular techniques can clarify phylogenetic relationships between teleomorphic fungi (sexual stage; Ascomycetes and Basidiomycetes) and anamorphic fungi (asexual stage; Deuteromycetes). Such studies to prove anamorph and teleomorph connections have been carried out by numerous workers (Câmara *et al*., 2001; Chaverri *et al*., 2001; Geiser *et al*., 2001; Réblová and Winka, 2001; Rossman *et al*. 2001, Chou and Wu, 2002; Zhang and Blackwell 2002).

2.10 Fungi on woody substrates

There have been several studies focusing on fungi on wood worldwide (Thienhirun, 1997; Crites and Dale, 1998; Tsui, 1999; Tsui *et al*., 2000; Allen *et al*., 2000; Boddy, 2001; Chatanon, 2001; Ho *et al*., 2002; Sivichai *et al*., 2002b). The obviously work included pathogenic, endophytic and saprobic fungi from both terrestrial and freshwater habitats. There is the truth that studies on lignicolous fungi still ill-documented when compare with other substrates such as leaf litter. This may be due to the difficulty in working with woody debris which is bulky, processing a low surface to volume ratio, requiring a longer time for decomposition during the process of an experiment, and thus a longer time for study (Shearer, 1992). There

have been studies concerning fungi on wood in temperate regions over several decades (e.g. Bernier, 1958; Koenigs, 1974; Scheffer, 1983). Most studies have focused on pathogenic fungi as they cause economic loss in farm production (e.g. Apple Scab, Dutch Elm Disease, Oak Wilt, Pine Cankers and Dieback, etc.). Studies concerning endophytic fungi on woody plant tissues occurred more recently (e.g. Carroll, 1986; 1988; Carroll *et al*., 1977; Bettucci and Saravay, 1993; Bills, 1996; Blodgett *et al*., 2000; Baayen *et al*., 2002; Arnold and Herre, 2003) and the numbers of studies have rapidly increased after Taxol (anti-cancer substance) was discovered in 1971 from the bark of the pacific yew; *Taxus brevifolia* Nutt. (Taxaceae, Ericoides).

Saprobic fungi on woody litter have been relatively well studied in temperate regions and less well studied in other parts of the world. Many fungi from woody substrate have been reported, including marine fungi, freshwater fungi and terrestrial fungi. Nowadays, several references on lignicolous fungi are published in mycological journal and some are published as thesis chapters worldwide e.g. Besitulo *et al*., 2002 (Philippines), Sivichai, 1999 (UK), Tsui, 1999 (Hong Kong), Ho, 1998 (Hong Kong), Thienhiran (1997) and Chatanon, 2001 (Thailand).

The fungi occurring on submerged wood in tropical regions have been widely studied, particularly by Hyde and his coworkers (in Hong Kong, Australia, Brunei, Philippines and China) and Jones and his coworkers (in Thailand). Many new species have been described from submerged wood in the tropics (Ho *et al*., 1997; 1999; 2000; Goh *et al*., 1998). Stanley and Hyde (1997) described a new species of *Boerlagiomyces* from submerged wood collected from a freshwater river. *Boerlagiomyces grandisporus* Stanley & Hyde is a new tropical freshwater

ascomycete, known only from the type collection made in Bacolod, Negros Occidental (Besitulo *et al*., 2002). Alias *et al*. (1995) determined the frequency of occurrence of mangrove fungi on wood in Malaysian mangroves and found that many factors such as salinity, length of exposure of substrate, wood species and location affected to the occurrence of fungi. In Hong Kong, Ho (1998) reported 222 fungi from his study on biodiversity and ecology of fungi on submerged wood in tropical streams, with 30 species including 6 genera new to science. Tsui (1999) studied the biodiversity of fungi on submerged wood in Hong Kong and China and recorded approximately 300 species from his work, including 110 ascomycetes and 170 anamorphic fungi with 11 new taxa having been published in a series of papers (e.g. Ranghoo *et al*., 2001; Tsui *et al*., 2002; 2003a; 2004). Besitulo *et al*. (2002) studied the biodiversity of mangrove fungi on fixed intertidal wood of *Rhizophora apiculata*, *Xylocarpus granatum*, *Nypa fruticans* and some driftwood collected from a mangrove forest at Siaegao Island, Philippines. Sixty-six species of mangrove fungi were recorded in her study (57 ascomycetes, 2 basidiomycete and 7 anamorphic fungi), with 46 species newly recorded for the Philippines.

2.11 Fungi on wood in Thailand

Thailand is believed to have a rich and diverse flora and fauna (Jones and Hyde, 2004). The exact number of fungal records for Thailand ranged from 700 species in 1989 to 2,000 species in 2001 (Hywel-Jones, 2001). Fungi in Thailand were first studied in 1902 (Schumacher, 1982), but until now our knowledge of fungi on wood is poor and requires significant further study. To date, there have been several studies focusing on fungal communities on wood, not only in freshwater (Sivichai *et*

al., 1998a, b; 2002b; 2003; Sivichai, 1999; Sivichai and Hywel-Jones, 1999), but also in terrestrial habitats (Sihanonth *et al*., 1998; Chatanon, 2001; Inderbitzin *et al*. 2001; Inderbitzin and Berbee, 2001).

BIOTEC (Thailand) is the first institute in Thailand which carried out research on freshwater fungi on wood and has published several ecological and biodiversity papers on the subject in several journals. Sivichai (1999) studied e fungal colonization on wood in selected streams in Khao Yai National Park and totally recorded 236 fungi (108 ascomycetes, 8 basidiomycetes and 120 anamorphic fungi). Most of the species collected were new records for Thailand and the results were documented in a series of papers (Sivichai *et al*., 2003; Jones *et al*., 1999; Pang *et al*., 2002; Sivichai and Jones, 2004). Later, Sivichai *et al*. (2000) reported on fungal colonization of wood of *Dipterocarpus alatus* and *Xylia dolabriformis* from a stream in Khao Yai National Park and 89 fungi were reported. Sivichai *et al*. (2002b) reported 73 fungal taxa from their work using a different collection site, a stream at Tad Ta Phu, Khao Yai National Park, and 7 new species were described.

There have been several contributions to Thai fungal records during 1960-1980 (Schumacher, 1982; Thienhirun, 1997). It has been estimated that about 250 species were collected in Thailand during various expeditions and field trips during that period (Schumacher, 1982). The records of fungi were from European mycologists and only a few from Thai mycologists who had undergone scientific training (i.e. Rostrup, 1902; Massee, 1902; Heim, 1962; Carroll, 1963; Dissing, 1963; Phanichapol, 1968). Other reports are in Thai or in unpublished postgraduate thesis. Few of the 250 reported species were lignicolous fungi and most were macrofungi (agarics, aphyllophorales, clavarioid, gasteromycetes, heterobasidiomycetes). This

was probably due to the easily observable nature of macrofungi and the restricted expertise of mycologists.

The first available record of study on ascomycetes in Thailand is that of Carroll (1963), who discovered some pyrenomycetous ascomycetes, that grew on wood and leaf litter. He collected 15 Thai xylariaceous fungi from Doi Suthep-Pui National Park, Chiang Mai, comprising 4 genera; *Daldinia*, *Hypoxylon*, *Sarcoxylon* and *Xylaria*. Two decades later, Schumacher (1982) identified 12 pyrenomycetes and 22 discomycetes from Chiang Mai and Lamphun, of which 25 species were new to Thailand. The substratum or hosts were not clearly recorded in all cases, making it impossible to determine whether the fungi can be categorized as lignicolous. *Daldinia concentrica*, *Plectania rhytidia*, *Pulvinula anthracobia*, two species of *Scutellinia* and two species of *Xylaria* however, were documented to occur on terrestrial wood (Table 2.5).

Over the next 20 years there were no reports on lignicolous fungi besides a few single records. Some new species have been described from terrestrial wood, e.g. *Aliquandostipe khaoyaiensis* (Inderbitzin *et al*., 2001), *Lollipopaia minuta* (Inderbitzin and Berbee, 2001) and *Entonaema siamensis* (Sihanonth *et al*., 1998) while a more comprehensive study of fungi on wood at Huai-Kha-Khaeng Wildlife Sanctuary was conducted by Chatanon (2001). Discomycetes in Doi Suthep-Pui National Park, Thailand have been studied by Tan-ar-sa (1998); 27 species were identified and twelve species appear to be lignicolous (Table 2.5). *Lollipopaia minuta* is a new genus of ascomycete discovered by Inderbitzin and Berbee (2001), during their field survey of decaying wood in Khao Yai National Park, Thailand. They applied both morphological characters and phylogenetic analyses based on small

subunit ribosomal DNA (SSU rDNA) to delineate the taxonomic position of the taxon. Such an approach has proved useful in solving taxonomic confusion in the ascomycetes, which have few taxonomic distinguishing characters (Mendes-Pereira *et al*., 2003). Inderbitzin *et al*. (2001) also reported one new fungus, *Aliquandostipe khaoyaiensis*, from decaying wood in a tropical rain forest, in Khao Yai National Park.

Chatanon (2001) studied the biodiversity of ascomycetes at Huai-Kha-Khaeng wildlife sanctuary, and is one of the most relevant works on Thai terrestrial lignicolous microfungi. Unfortunately this work has not been published in any journal. Wood, branches, bark and fallen leaves collected during the summer, rainy and winter seasons were studied for fungi in three forest types (dry evergreen forest, mix deciduous forest and deciduous dipterocarp forest). Chatanon (2001) observed that fruiting bodies of ascomycetes were mostly found on bark and hard wood. She concluded that diversity of fungi in dry evergreen forest was higher than in mix deciduous forest and deciduous dipterocarp forest, and found highest diversity in the rainy season. Sixty-seven ascomycetes were reported in this study with 36 lignicolous species.

Xylariaceous fungi are a group of ascomycetes with great biodiversity and abundance in tropical Asian forests. They are common on terrestrial wood, as endophytes in living branches or saprobes in dead branches. These wood decay fungi develop on dead angiosperms, and can degrade lignin of angiosperm wood and degrade lignin. This type of decay is called white rot and only a few fungi process whte rot lignin-degrading enzymes (Eriksson *et al*., 1990; Eaton and Hale, 1993). About 60 lignicolous terrestrial microfungi were reported by Thienhirun (1997), in a

preliminary account of the *Xylariaceae* of Thailand. Extensive surveys of forests in Thailand resulted in the collection of over 1,500 specimens in 17 genera of *Xylariaceae* (Thienhirun, 1997). Ruksavong (2001) published "*Thai mushrooms and other fungi*" which listed 41 lignicolous terrestrial microfungi in Thai forests. Genera included *Biscogniauxia, Camellea, Daldinia, Entonaema, Eutypa, Hypocrea, Hypoxylon, Nectria, Poronia, Rhapolostroma, Rosellinia* and *Xylaria*. Apart from increasing the number of Thai fungal records this book provides indications that the Thai mycota is not only very diverse but probably contains numerous previously undescribed species. The richness of Thailand's mycota has been confirmed in several recent papers (e.g. Thongkantha *et al*., 2003).

Table 2.5 Lignicolous terrestrial microfungi known from Thailand

Taxa	Families	References
Aliquandostipe khaoyaiensis	Aliquandostipitaceae	Inderbitzin *et al*., 2001
Bacidia endoleuca	Ramalinaceae	Chatanon, 2001
Bisporella citrina	Helotiales, Helotiaceae	Tan-ar-sa, 1998
Bulgariella sp.	Helotiales, Helotiaceae	Tan-ar-sa, 1998
Chlorosplenium sp.	Helotiales, Helotiaceae	Tan-ar-sa, 1998
Cookeina tricholoma	Sarcoscyphaceae	Chatanon, 2001
Daldinia concentrica	Didymosphaeriaceae	Schumacher, 1982
Daldinia diplospora	Didymosphaeriaceae	Chatanon, 2001
Daldinia eschscholzii	Xylariaceae	Chatanon, 2001
Dasyscyphus mollissinus	Helotiales, Hyaloscyphaceae	Tan-ar-sa, 1998
Dasyscyphus nudipes	Helotiales, Hyaloscyphaceae	Tan-ar-sa, 1998
Dasyscyphus spp.	Helotiales, Hyaloscyphaceae	Tan-ar-sa, 1998
Entonaema siamensis	Xylariaceae	Sihanonth *et al*., 1998
Eutypella acericola	Diatrypaceae	Chatanon, 2001
Eutypella stellulata	Diatrypaceae	Chatanon, 2001
Gibbera vaccinii	Venturiaceae	Chatanon, 2001
Gorgoniceps confluens	Helotiaceae	Chatanon, 2001
Gyalecta truncigena	Gyalectaceae	Chatanon, 2001
Hercospora schweinitzii	Hypocreaceae	Chatanon, 2001
Hercospora spledens	Hypocreaceae	Chatanon, 2001
Hercospora tiliae	Melanconidaceae	Chatanon, 2001
Hypoxylon fendleri	Xylariaceae	Chatanon, 2001
Hypoxylon haematostroma	Xylariaceae	Chatanon, 2001
Hypoxylon jecorinum	Xylariaceae	Chatanon, 2001
Hypoxylon lenormandii	Xylariaceae	Chatanon, 2001
Hypoxylon perforatum	Xylariaceae	Chatanon, 2001
Hypoxylon rubiginosum	Xylariaceae	Chatanon, 2001
Hysterium angustatum	Hysteriaceae	Chatanon, 2001

Table 2.5 (Continued).

Taxa	Families	References
Hysterium pulicare	Hysteriaceae	Chatanon, 2001
Lecidella elaeochroma	Lecanoraceae	Chatanon, 2001
Leptosphaeria acuta	Leptosphaeriaceae	Chatanon, 2001
Lollipopaia minuta	Diaporthales	Inderbitzin and Berbee, 2001
Lophiostoma fuckelii	Lophiostomataceae	Chatanon, 2001
Mollisia sp.	Helotiales, Dermateaceae	Tan-ar-sa, 1998
Nectria keithii	Nectriaceae	Chatanon, 2001
Opegrapha vulgate	Roccellaceae	Chatanon, 2001
Orbilia curvartispora	Helotiales, Orbiliaceae	Tan-ar-sa, 1998
Peroneutypa heteracantha	Diatrypaceae	Chatanon, 2001
Peziza sepiatra	Pezizales, Pezizaceae	Tan-ar-sa, 1998
Phaeangellina sp.	Helotiales, Helotiaceae	Tan-ar-sa, 1998
Plectania rhytidia	Pezzizaceae	Schumacher, 1982
Pulvinula anthracobia	Pezizales incertae sedis	Schumacher, 1982
Quaternaria quaternata	Diatrypaceae	Chatanon, 2001
Scutellinia badio-berbis	Pyronemataceae	Schumacher, 1982
Scutellinia colensoi	Pyronemataceae	Schumacher, 1982
Scutellinia scutellata	Pezizales, Humariaceae	Tan-ar-sa, 1998
Trematosphaeria pertusa	Melanommataceae	Chatanon, 2001
Valsella salicis	Valsaceae	Chatanon, 2001
Xylaria allantoidea	Xylariaceae	Chatanon, 2001
Xylaria arbuscula	Xylariaceae	Chatanon, 2001
Xylaria cornu-damae	Xylariaceae	Schumacher, 1982
Xylaria cubensis	Xylariaceae	Chatanon, 2001
Xylaria fissilis Ces.	Xylariaceae	Schumacher, 1982
Xylaria obovata	Xylariaceae	Chatanon, 2001
Xylaria oligotoma	Xylariaceae	Chatanon, 2001
Xylaria polymorpha	Xylariaceae	Chatanon, 2001
Xylaria schweinitzii	Xylariaceae	Chatanon, 2001

In summary, studies of lignicolous microfungi in Thailand have only been undertaken during the last few decades. Some studies remain unpublished, while others lack details of substrata, location and dates, data essential for proper recording of fungi. Some studies are published in journals with poor circulation or that are in Thai. Lignicolous fungi therefore require further study in Thailand and future studies should provide proper collection details (Kodsueb *et al*., 2004a).

2.12 Magnoliaceae

The Magnoliaceae are woody trees and shrubs comprising 12 genera and about 220 species. The family Magnoliceae was introduced by Antoine Laurent de Jussieu, in 1789. Flowering plants in this family encompass between 7-12 genera; *Drymidis*, *Elmerillia*, *Kadsura*, *Kmeria*, *Liriodendron*, *Magnolia*, *Manglietia*, *Michelia*, *Pachylarnax*, *Schizandra*, and *Talauma*. Recently, Brummitt (1992) accepted only 7 genera in the family (*Elmerrillia*, *Kmeria*, *Liriodendron*, *Magnolia*, *Manglietia*, *Michelia* and *Pachylarnax*).

2.12.1 Distribution and habitats of Magnoliaceae

Source: www. eeob.iastate.edu

Figure 2.1 Distribution of Magnoliaceae

Number of genera: about 12. **Number of species:** about 220.

Distribution: 80% are found in temperate and tropical South East Asia, 20% are found in USA.

Economic uses: Valued ornamentals (*Magnolia* and *Liriodendron*), medicinal plant and some useful timbers.

2.12.2 Definition and classification of Magnoliaceae

The family Magnoliaceae represents one of ten families in the order Magnoliales, with eight orders comprising the subclass Magnoliidae (Class Magnoliophyta; Angiosperms; Cronquist, 1981). The Magnoliaceae is subdivided into 12 genera containing approximately 220 species (Watanabe *et al*., 2002) to 230 species (Dandy, 1950), about eighty percent of which occur in Southeast Asia (Latimer, 1994, Watanabe *et al*., 2002). The family Magnoliaceae is an ancient plant family deemed by many plant systematists to encompass a group of the most primitive living angiosperms (Azuma *et al*., 1999). The three lagest genera of the family are *Magnolia* (80 species), *Michelia* (50), and *Talauma* (50) [Smith, 1977; Cronquist, 1981]. The small genus *Liriodendron* (2) is an important component of some forests in the southeastern United States. The remaining genera, all of which only occur naturally outside the United States, included *Manglietia* (25), *Alicimandra* (1), *Aromadendron* (4), *Pachylarnax* (2), *Kmeria* (2), *Elmerellia* (6), *Paramichelia* (3), and *Tsoongiodendron* (1) [Heywood, 1978]. Taxonomic classification of the Magnoliaceae has been undertaken by several systematists and while each may have used similar morphological characters in the classification system, the end result has been a series of conflicting schemes (Dandy, 1927; Law, 1984; Nooteboom, 1985, 1987; Liang and Nooteboom, 1993).

The Magnoliaceae are evergreen or more commonly deciduous trees or shrubs (Cronquist, 1981). The leaves are alternate, simple, pinnately veined, petioled, entire (lobed in *Liriodendron*), and early deciduous stipules enclose the bud, their abscission leaving a characteristic scar around the node (Cronquist, 1981). Flowers are mostly

six or more merous with multiple series of petals, often in three series of three petals. The androecium is composed of numerous separate stamens (Smith, 1977).

Scientific classification of Magnoliaceae (*from Wikipedia website)

Kingdom: Plantae

Division: Magnoliophyta

Class: Magnoliopsida

Order: Magnoliales

Family: Magnoliaceae Juss.

Genera:

Magnolioideae
Elmerillia (4 species)
Kmeria (5 species)
Magnolia (128 species)
Manglietia (29 species)
Michelia (49 species)
Pachylarnax (2 species)
Liriodendroidae
Liriodendron (2 species)

Synonymous genera:

Alcimandra Dandy = ***Magnolia*** L.
Aromadendron Blume = ***Magnolia*** L.
Dugandiodendron Lozano = ***Magnolia*** L.
Elmerrillia Dandy
Kmeria (Pierre) Dandy
Liriodendron L.
Magnolia L.
Manglietia Blume
Manglietiastrum Y.W.Law = ***Magnolia*** L.
Michelia L.
Pachylarnax Dandy
Parakmeria Hu & W.C.Cheng = ***Magnolia*** L.
Paramichelia Hu = ***Michelia*** L.
Talauma Juss. = ***Magnolia*** L.
Tsoongiodendron Chun = ***Michelia*** L.

***Magnolia* L.**

Magnolia liliifera (L.) Baill.

Common name: Magnolia

Thai Local name: Montha-Khao

Magnolia is an evergreen tree genus, locally common, restricted to less disturbed areas. The tree is up to 15 m high with open irregular crown and smooth, pale brown bark. Leaf 20-50 × 7-15 cm, narrowly obovate with blunt tip and tapering at the base. Mature leaf dark green, smooth or with scattered hairs on midvien below. 9-15 pairs of widely spaced side viens. Stalks 5-7 cm, swollen at base, stipule scar more than ¾ of total length. Flower up to 15 cm, white, solitary at end of twigs with stout stalks, 1.5-3 cm. Buds 3-4 cm, globular, covered by a purple bract. Sepals/petals 5-7 cm, thick and fleshy, innerones narrower, falling soon after opening. Differs structurally from *Michelia* by the absence of a stalk on the central cone. Fruit woody, oblong, 10-15 cm, splitting up when mature into 30-50 separate portions each with a bright red seed (Gardner *et al*., 2000).

Figure 2.2 *Magnolia liliifera*. 1. The whole tree. 2. Stem and branches. 3. Leaves. 4. Flower. 5. Fruit. 6–7. Twigs. Note: 4–5 from Gardner *et al*., 2000.

***Manglietia garrettii* Craib**

Common name: Manglietia

Thai Local Name: Montha-Doi, Montha-Daeng

Partly deciduous tree, up to 25 m high, with smooth, grayish bark. Leaf 18-30 × 8-12 cm, narrowly elliptic with ± tapering tip and blunt or slightly pointed base. Mature leaves dark green above, grayish-green below, smooth or nearly so, 15-25 pairs of side veins. Stalks 3-5 cm, swollen at base, densely brown-hairy especially when young, stipule scar ½ of total length. Flower up to 18 cm across, dark pink-purple, buds narrowly ovoid, structurally very similar to *Magnolia*. Fruit 4-8 cm, ovoid, not breaking up (Gardner *et al*., 2000).

***Michelia baillonii* (Pierre) Fin. & Gagnep.**

Common name: Michelia.

Thai Local name: Cham-pee-pa.

The genus is a briefly deciduous tree, up to 40 m high, common in hill evergreen forest throughout northern Thailand. Leaf 15-22 × 5-8 cm, narrowly elliptic or oblong, pointed or tapering at both ends. Buds narrow and pointed, young leaves with dense silvery-silkys hairs, mature leave smooth or nearly so. 10-15 pairs of side viens with dense network of smaller ones. Stalks 2.5-3.5 cm, stipule scar less than ½ of total length. Flower white, 12-18 sepals/petals, outer ones lanceolate, 2-2.5 × 0.5 cm, inner ones linear, stamens 7-8 mm, carpels densely grey-hairy. Fruit 5-8 cm, yellow-green with pale spots, irregularly knobbly, breaking up when mature, leaving characteristic skeletal husks which often remain on the tree throughout the year. Seeds bright red (Gardner *et al*., 2000).

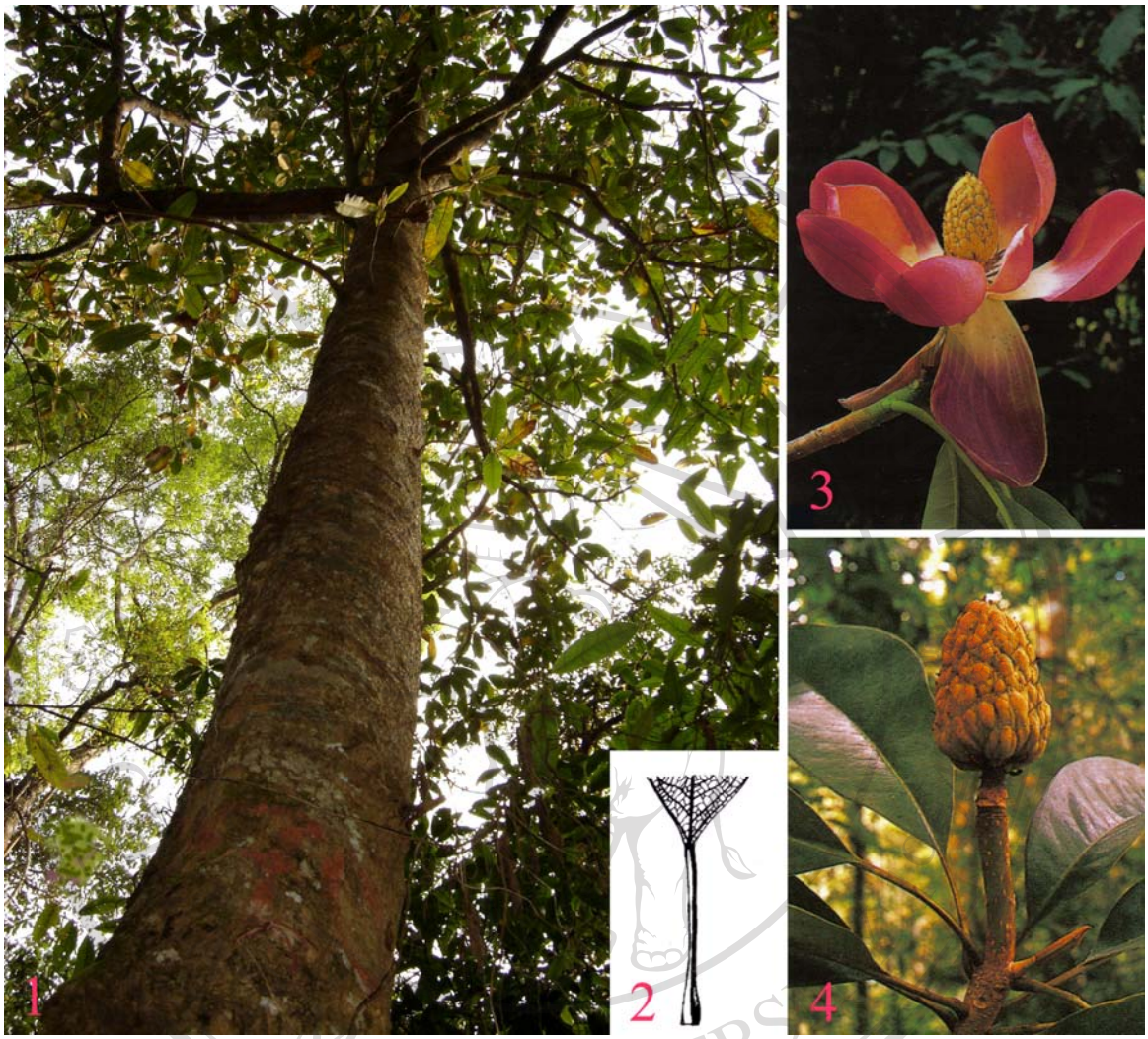

Figure 2.3 *Manglietia garrettii*. 1. The whole tree. 2. Petiole. 3. Flower. 4. Fruit.

Note: 2–4 from Gardner *et al*., 2000.

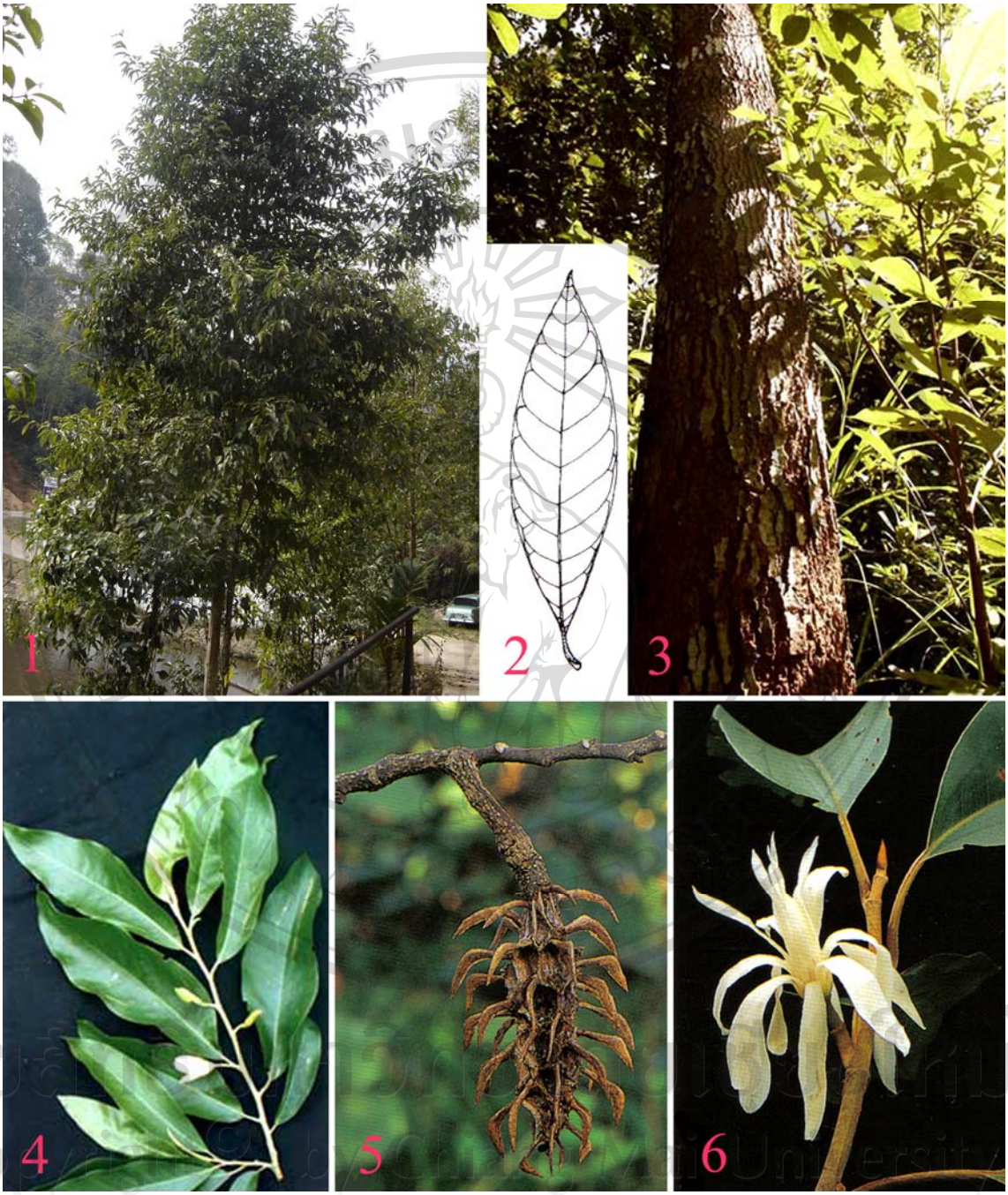

Figure 2.4 *Michelia baillonii*. 1. The whole tree. 2, 4. Leaves. 3. Stem. 5. Fruit. 6. Flower. Note: 2, 5–6 from Gardner *et al*., 2000.

2.12.3 Importance of Magnoliaceae

The family is important as an ornamental plant, used as gardening value, and as herbal plant that can produce some medicinal substances (magnoloid…etc). Bark, leaf, and fruit teas have been used to treat fevers, rheumatism, and stomach ailments. The bark from *M. officinalis* has long been used in traditional Chinese medicine, where it is known as *houpu*. In Japan, *M. obovata* has been used in a similar manner. The aromatic bark contains magnolol and honokiol, two polyphenolic compounds that have demonstrated anti-anxiety and anti-angiogenic properties. Magnolia bark also has been shown to reduce allergic and asthmatic reactions (wikipedia website).

2.13 Fungi on Magnoliaceae

Several studies on the family Magnoliaceae have been investigated, including morphological systematics (e.g. Maneval, 1912; Roever, 1937; Canright, 1949), molecular systematics (e.g. Sewell, 1992; Qiu, 1993; Cevallos-Ferriz, 1990, Azuma *et al*., 2001; Kim *et al*., 2001) and phytochemical study (Wilton, 1982; Song, 1995). However, only few works have focused on fungi on Magnoliaceae (Ahn, 1996, Promputtha *et al*., 2002, 2003, 2004a, b, c; 2005b, Kodsueb *et al*., 2004a, 2006c, 2007b).

2.13.1 Index of fungi known from the Magnoliaceae

Host Index

Liriodendron

Ascomycetes

Arthonia dispersa (Schrad.) in Rehm, *Disc*.: 437. Europe, on small branches and trunks of *Liriodendron*. Current name: *Arthonia dispersa* (Schrad.) Nyl.

Aulographum hieroglyphicum Roberge & Desm., 16 *Not*.: 356 (1849). On fallen leaves of *Liriodendron tulipifera.*

Blitridium nigrocinnabarinum (Schwein.) Sacc. [as '*Blitrydium*'], *Saccardo's Syll. fung.* (Abellini) 8: 805 (1889). USA (Carolina, Pensylvania), Cuba, Surinum, New Zealand and Africa, on decayed and rotten trunk/twig of *Liriodendron*. Basionym: *Patellaria nigrocinnabarina* Schwein.

Botryosphaeria liriodendri (Cooke) Sacc., *Saccardo's Syll. fung.* 5: 465 (1882). USA, Carolina, Airken, on bark of *Liriodendron*. Basionym: *Sphaerella liriodendri* Cooke

Capnodium elongatum Berk. & Desm., *Berk. Moulds referred Fumago*: 251 (1849), *Journal of the Royal Horticultural Society* 4: 250 (1849). Europe and USA, on leaves of *Liriodendron*.

Clypeolum talaumae Racib., *Parasit. Alg. Pilze Java's* (Jakarta) 3: 35 (1900). Java, on leaves of *Talauma mutabilis*.

Diaporthe tetrastagadelitescens Bomm. Rouss. Sacc. Belgium, Tervueren, on branches of *Liriodendron tulipifera*.

Diatrype plagia Berk. & M.A. Curtis, *Cuban Fungi* 854. USA, Carolina, on branches of *Liriodendron*.

Diatrypella liriodendri (Schwein.) Sacc. ,*Curr. in Linn. Trans. 22*. USA, Carolina, grouped on bark of *Liriodendron tulipifera*. Basionym: *Sphaeria. liriodendri* Schwein.

Didymosphaeria phyllogena G. Winter. *Journ. Myc.* 1: 121 (1885). USA, Missouri, on fallen leaves of *Liriodendron tulipifera*.

Endoconidiophora virescens R.W. Davidson, *Mycologia* 36: 301 (1944). USA, Southern States, on *Liriodendron tulipifera,*. Current name: *Ceratocystis virescens* (R.W. Davidson) C. Moreau

Erysiphe communis f. *liriodendri* Jacz., *Taschenbestimmb. f. Pilze* 2*, Erysiphaceen*: 249 (1926). On leaves of *Liriodendron tulipifera*.

Erysiphe liriodendri Schwein., *Syn. Am. Northern* 2480. USA, Bethlehem, Oneida, on leaves of *Liriodendron tulipifera*.

Excipula nitidula Schwein., *Syn. Amer. bor.* n. 2127. USA, Pennsylvania, Bethlehem, on wood of *Liriodendron tulipifera*.

Hypocrea rufa (Pers.) Fr., *Summa veg. Scand.*, Section Post. (Stockholm): 383 (1849). Fennia, Suecia, UK, Germany, Russia (USSR), Belgium, Italy, Sri Lanka (Ceylon), USA and Spain, on bark of wood of *Quercus*, *Fagus*, Pine, *Liriodendron*. Basionym: *Sphaeria rufa* Pers.

Hypoxylon croceum J.H. Mill., *Mycologia* 25: 323 (1933). USA, on dead trunks of *Liriodendron tulipifera*.

Hypoxylon occidentale P.M.D. Martin [as 'Ellis and Morgan ex Martin'], *Jl S. Afr. Bot.* 35: 191 (1969). USA, Ohio, on *Liriodendron*. Current name: *Hypoxylon croceum* J.H. Mill.

Hypoxylon regale Morgan, *Journ. of Mycol.* 10: 162 (1904). USA, Ohio, Preston, on decayed wood of *Liriodendron*.

Lachnea erinaceus Schwein., *Syn. Car.* n. 1194 (*Pez.*), Cooke *Myc.* f. 140. USA, Pensylvania, on decayed wood of *Liriodendron*. Basionym: *Peziza erinaceus* Schwein. Current name: *Scutellinia erinaceus* (Schwein.) Kuntze.

Lophodermium maculare (Fr.) De Not., *G. bot. ital.*, n.s. 2: 45 (1847) and *Ister.*: 40. Suecia, Belgium, Germany, Italy, UK, Gallia, USA (Carolina, Florida), Sri Lanka, on leaves of *Liriodendron*. Basionym: *Hysterium maculare* Fr.

Lulworthia attenuata T. W. Johnson, *Mycologia* 50: 157 (1958). USA, North Carolina, on submerged wood of *Liriodendron*.

Melogramma liriodendri Cooke, *Rav. Fungi Am.* 353. USA, Carolina, Airken, on bark of *Liriodendron*.

Metasphaeria liriodendri f. *catalpae* Feltgen, *Vorstud. Pilz. Luxemb. Nachtr.* 3: 233 (1903). Luxemburg, on bark of *Bignonia catalpa*.

Metasphaeria liriodendri Pass., *Diagn. Fung. Nuovi* 3, n. 28. Italy, Botanical Garden, on dry branches of *Liriodendron tulipifera*, found with *Phoma thümenii*.

Microdiscus americanus (Sacc.) Trotter, *Nuovo Giorn. Bot. Ital.* 23: 190 (1916). USA, New York, Catskill Mountain, on decayed wood of *Liriodendron tulipifera*. Basionym: *Microascus americanus* Sacc..

Mycosphaerella liriodendri (Cooke) Woron., *Vest. tiflis. bot. Sada* 35: 6 (1915). Georgia, Darien, on leaves of *Liriodendron tulipifera*. Basionym: *Sphaerella liriodendri* Cooke.

Mycosphaerella tulipiferae (Schwein.) B.B. Higgins, *Am. J. Bot.* 23: 598 (1936). USA, parasitic on living leaves of *Liriodendron tulipifera*. Basionym: *Sphaeria tulipifera* Schwein.

Nectria magnoliae M.L. Lohman & Hepting, *Lloydia* 6: 91 (1943). USA, West Virginia, on *Liriodendron tulipifera*.

Orbilia vinosa (Alb. & Schwein.) P. Karst., *Mycoth. fenn.* (Helsinki) 1: 101 (1871). Suecia, Fennia, Germany, UK, Italy, Gallia, USA, Sri Lanka, Brazil, Cuba, on bark and leaves of Oak, Maple and *Liriodendron*.

Ostropa cinerascens Schwein., *Syn. Amer. bor.* n. 1832. USA, Bethlehem, 0n wood strip of *Liriodendron*.

Phomopsis liriodendri Grove, *London Journal of Botany* 68: 275 (1930). Anglia, on dead branches of *Liriodendron tulipifera*.

Phyllactinia suffulta f. *liriodendri* Jacz., *Taschenbestimmb. f. Pilze.*2, *Erysiphaceen*: 433 (1926). USA, on leaves of *Liriodendron tulipifera*.

Pleosphaeria microloncha (Berk. & M.A. Crutis) Sacc., *Saccardo's Syll. fung.* 2: 305 (1883). USA, Carolina, on inner bark of *Liriodendron*. Basionym: *Sphaeria microloncha* Berk. & M.A. Curtis.

Pleospora herbarum var. *liriodendri* Berl., *N. Giorn. Bot. it.* 20: 100 (1888). Lusitania, on dead leaves of *Liriodendron*.

Raciborskiella talaumae (Racib.) Höhn., *Parasit. Algen und Pilze Javas* 3: 35 (1900). Java, on leaves of *Talauma mutabilis*. Basionym: *Clypeolum talaumae* Racib.

Rhytisma liriodendri Wallr., n. 2292 sub *Xylom.*, *Ectostroma Fr. Syst. Myc.* 2: 602. Germany and Italy, on wilt leaves of *Liriodendron tulipifera*.

Rosellinia subiculata (Schwein.) Sacc., *Saccardo's Syll. fung.* (Abellini) 1: 255 (1882). USA, Carolina on decayed wood of *Liriodendron*. Basionym: *Sphaeria subiculata* Schwein.

Sphaerella carpogena Pass., *Diagn. F. nuovi* 1, n. 9. Parma, Botanical garden, on fruit of *Liriodendron tulipifera*.

Sphaerella elatior Sacc. & Speg., *Michelia* 1: 379 (1878). Conegliano, on decayed leaves sheet of *Liriodendron tulipifera*.

Sphaerella infuscans Ellis & Everh., *Bull. Torr. Bot. Cl.*: 504 (1898). USA, West Virginia, on senescent petiole of *Liriodendron tulipifera*.

Sphaerella liriodendri Cooke, *Journ. of Bot.*: 108 (1883). Georgia, Darien, on leaves of *Liriodendron tulipifera*.

Sphaeria liriodendri Schwein., *Schr. naturf. Ges. Leipzig* 1: 33 (1822). USA, Carolina, grouped on bark of *Liriodendron tulipifera*. Synonym: *Diatrypella liriodendri* (Schwein).

Sphaeria transversalis Schwein. & Fr., *Elench. fung.* (*Greifswald*) 2: 108 (1828). Salam, everywhere in small rotten branches of *Liriodendron*.

Sphaeria tulipiferae Schwein., *Syn. Amer. bor.* n. 1822. USA, Bethlehem, on green/fresh fallen leaves of *Liriodendron*.

Tapesia epicladotricha Sacc., *Ann. Mycol.* 6: 565 (1908). Junio, Lyndonville, on rotten wood of *Liriodendron*?. = *Mollisia* (Fr.) P. Karst. (1871) [nom. cons.].

Teichospora tuberculata Ellis & Everh., *Proc. Acad. Phil.*: 332 (1894). USA, Ohio, on dead wood of *Liriodendron*.

Valsa albopuncta Ellis & Everh., *Field Columb. Mus.* 9: 133 (1896). USA, West Virginia, on dead branches of *Liriodendron tulipifera*.

Venturia liriodendri Hanlin, *Mycologia* 79: 465 (1987). USA, Georgia, on leaves of *Liriodendron tulipifera*.

Xylaria mucronata (Schwein.) Sacc., *New Sphaer. Amer.*: 5, *Fr. S. M.* 2: 326. USA, Carolina, on trunk of *Liriodendron*. *Sphaeria mucronata* Schwein.

Xylogramma hysterinum (Fr.) Rehm, *Discomycetes*: 171, *Stictis hysterina* Fr. *Syst. Myc.* 2: 199. USA, Suecia, germany, Gallia, on wood of *Liriodendron* wood.

Basidiomycetes

Agaricus (Pholiota?) *tulipiferae* Terrace, *Peregr bot. Terra di Lavoro* 1: 229 (1872). Caserta, Viridario region, on root of *Liriodendron tulipifera*.

Boletus aurantiosplendens T.J. Baroni, *Bulletin of the Buffalo Society of Natural Sciences* 36: 245 (1998). North Carolina, on humus of mixed woods of *Fagus*, *Quercus*, *Acer*, *Carya*, *Liriodendron* and *Pinus*.

Fomes fulvus Fr., Epicr.: 465. *monogr.* 2: 270. *Hym. Eur.*: 559. USA, Pensilvania, on trunk of *Liriodendron*.

Hyphodontia lanata Burds. & Nakasone, *Mycologia* 73: 461 (1981). On *Liriodendron tulipifera*, Miss., USA.

Lentinus strigosus (Schwein.) Fr., *Epicr. syst. mycol.* (Upsaliae): 388 (1838) [1836]. USA, Carolina, on trunk of *Liriodendron*.

Merulius atrovirens Burt, *Ann. Miss. Bot. Gard*. 4: 359 (1917). USA, North Carolina, Yancey County, Mt. Michell, on fallen trunk of *Liriodendron tulipifera*. Current name: *Leucogyrophana pinastri* (Fr.) Ginns & Weresub

Merulius interruptus Bres., *Mycologia* 17: 72 (1925). USA, on branches of *Liriodendron*.

Tomentella brunneorufa M.J. Larsen, *Mycologia Memoir* 4: 37 (1974). USA, MD, on *Liriodendron*.

Coelomycetes

Ascochyta liriodendri Woron., *Izv. Kavkaz. Muz.* 9: 119 (1915). USSR, on leaves of *Liriodendron tulipifera*.

Asteroma liriodendri Cooke, *Grevillea* 12: 25. USA, Carolina, on leaves of *Liriodendron*.

Camarosporium tulipiferae Died., *Ann. Myc.*: 182 (1904). On dry branches of *Liriodendron tulipifera*, Thuringia., *Jl S. Afr. Bot.* 35: 191 (1969). USA, Ohio, on *Liriodendron*. [non *H. occidentals* Ellis & Ever. (1894).

Ceuthospora liriodendri Westend., *Bull. Ac. Roy. Belg.* 2. Belgium, Namur garden, on fruit of *Liriodendron tulipifera*.

Cryptosporiopsis liriodendri Weindlm., *Sydowia* 18: 29 (1965). Denmark, on dry twigs of *Liriodendron tulipifera*.

Cylindrosporium cercosporoides Ellis & Everh., *Journ. Myc.*: 22 (1887). USA, Washington, on living leaves of *Liriodendron tulipifera*.

Cytospora tulipiferae Died., *Ann. Mycol.* 4: 414 (1906). Germany, near Halle, on dead branches of *Liriodendron tulipifera*.

Diplodia liriodendri Peck, *Rep. N.Y. St. Mus. nat. Hist.* 44: 24 (1890). USA, Sandlake North, on branches of *Liriodendron tulipifera*.

Diplodia tulipiferae Died., *Ann. Mycol.* 4: 414 (1906). Germany, near Halle, on dry branches of *Liriodendron tulipifera*.

Dothiorella liriodendri (Cooke) Sacc. *Cfr. Syll.* 1: 465. USA, Carolina, on bark of *Liriodendron*. Basionym: *Sphaerella liriodendri* Cooke.

Dothiorella minor Ellis & Everh., *Field Columb. Mus.* 9: 110 (1896). USA, West Virginia On dead branches of *Liriodendron tulipifera*.

Gloeosporium liriodendri Ellis & Everh., *Journ. Myc.*: 128 (1887). USA, Faulkland, on leaves of *Liriodendron tulipifera*.

Hendersonia pauciseptata Berk. & M.A. Curtis, *North Amer. Fungi* n. 425 (1853). USA, Carolina and Pensylvania, on branches of *Liriodendron, Lauri benzoin*, *Populus dilatatae*, *Lagerstromie*.

Leptostroma omissum Hilitzer, *Monograf. Stud. Cesk. Druz. Hysteriales*: 105 (1929). Europe and USA, on branches of *Liriodendron*.

Leptothyrium liriodendri Cooke, *Grevillea* 14: 90. USA, South Carolina, Aiken, on leaves of *Liriodendron*.

Melanconium celtidis Eliis & Everh., *New West Amer. Fung*.: 24 in Erythea 2 (1894). New York, on strip wood of *Liriodendron tulipifera*.

Microdiplodia lophiostomoides Dearn. & House, *N. York St. Mus. Bull.* 188: 36 (1916). USA New York, Madison Co., Oneida, on dead branches of *Liriodendron tulipifera*.

Myxosporium coloratum (Peck) Sacc., *Torr. bot. Club.*: 74 (1883). USA, Pensylvania, on bark of *Liriodendron tulipiferae*. *Melanconium coloratum* Peck,

Myxosporium liriodendri Dearn. & House, *Bull. N. Y. St. Mus.* 266: 92 (1925). USA, New York, On dead shoots of *Liriodendron tulipifera*.

Myxosporium longisporum Edgerton, *Ann. Mycol.* 6: 53 (1908). USA, New York, Poughkeepsie, on branches of *Liriodendron tulipifera*.

Myxosporium megallanto Dearn., *Mycologia* 20: 241 (1928). USA, New York, Southold, on dead branches of *Liriodendron tulipifera*.

Myxosporium tulipiferae Died., *Ann. Myc.*: 514 (1904). Thuringia, Erfurt, on dead branches of *Liriodendron tulipifera*.

Phoma atomispora var. *liriodendri* Negru & Vlad, *Izv. Acad. Sci. Armyan SSR., biol. Sci.* 15: 44 (1962). Romania, on leaves of *Liriodendron tulipifera*.

Phoma liriodendri Thüm., *Fungi littor* 170. Italy, Parmensi, Botanical garden, on dry branches of *Liriodendron tulipifera*.

Phoma liriodendri Westend., *Exs.* n. 967., *Lamb. Myc. Belg*. 3: 83. Belgium, Namur, on fruit of *Liriodendron tulipifera*.

Phoma mixta Berk. & M.A. Curtis, *North Amer. Fungi* n. 388. USA, Carolina and Pensylvania, on barkened branches of *Liriodendron*, *Viburni opulifolii*.

Phoma mixta Berk. & M.A. Curtis, *Syll.* 3: 90 (forma *santonensis* Brun.) *Glan. mycol. Ser.* 3, Herbos. 1892-93: 4. Gallia, Saintes, on dead branches of *Liriodendron tulipifera*.

Phoma pterogena Pass., *Diagn. F. N.* 4, n. 66. North Italy, Town Botanical Garden, on fallen fruit of *Liriodendron tulipifera*.

Phoma thümenii Pass., *Diagn. F. N.* 6, n. 65, *Fungi littor.* 170? North Italy, Town Botanical Garden, on dry branches of *Liriodendron tulipifera*.

Phoma tulipiferae Schwein., *Syn. Am. bor. n. 2167.* USA, Bethlehem, Sparsely on leaves of *Liriodendron*.

Phyllosticta circumvallata G. Winter, *Journ. of Myc.* (1885). USA, Missouri, on wilt leaves of *Liriodendron tulipifera*.

Phyllosticta liriodendri Thüm., *Contr. Mic. Lit.* n. 213 (1879). Gorizia, on living leaves of *Liriodendron tulipifera*.

Phyllosticta liriodendrica Cooke, *Grevillea* 12: 26. (*Ph. Liriodendri*)., Austr., Carolina, on leaves of *Liriodendron*.

Phyllosticta macrospora Ellis & Everh., *Proc. Acad. Phil.*: 355 (1894). USA, Virginia, on leaves of *Liriodendron tulipifera*.

Phyllosticta tulipiferae Pass., *Diagn. F. N.* 3, n. 49. North Italy, Parma Botanical garden, on living leaves of *Liriodendron tulipifera*.

Rhabdospora liriodendri Sandu, *Rev. roum. Biol., Bot.* 9: 263 (1964). Romania, on dry branches of *Liriodendron tulipifera*.

Rhabdospora liriodendri Sandu, *Studii Cerc. Biol. Bot.* 16: 301 (1966). Romania, on dry branches of *Liriodendron tulipifera*.

Stagonospora liriodendri Siemaszko, *Acta Sec. Bot. Polon* 51: 8 (1923). Transcaucasia, on living leaves of *Liriodendron tulipifera*.

Stagonospora liriodendri Siemaszko, *Acta Seoc. Bot. Polon.* 11: 8 (1923). Caucasus, Adzaria, Batum, Czakwa province, on living leaves of *Liriodendron tulipifera*.

Stagonospora liriodendron Ellis. & Everh., *Proc. Acad. Phil.*: 365 (1894). New York, on wood (without bark) of *Liriodendron tulipifera*.

Stagonospora pedunculi Ellis & Everh., *New Fung. in Proceed. Acad. N. Sc. Philad.*: 457. Virginia occid, on senescent pedicle of *Liriodendron tulipifera*.

Vermicularia albo-maculata Schwein., *Syn. Amer. bor.* n. 1858. USA, Buffalo, Bethlehem, Smilacis, on various fallen leaves, *Liriodendron*, *Populus*. = *Colletotrichum* Corda (1831) [1837]

Vermicularia petalicola Eliis & Everh., *New Fung. Proceed. Acad. N. Sc. Philad.*: 456 (1893). USA, Delaware, on fallen petal of *Liriodendron tulipifera*.

Hyphomycetes

Alternaria liriodendri T.Y. Zhang & J.Z. Zhang, in Zhang, Zhang, Chen, Ma & Gao, *Mycotaxon* 72: 435 (1999). Taiwan, Shaanxi, on living leaves of *Liriodendron chinensis*.

Cercospora liriodendri Ellis & Harkn. *Bull. Torrey Bot. Club* 8: 27 (1881). USA, New Jersey, Vineland, on leaves of *Liriodendron tulipifera*. Synonym: *Phaeoisariopsis liriodendri* (Ellis & Harkn.) Morgan-Jones.

Cladosporium liriodendri K. Schub. & U. Braun, *Schlechtendalia* 14: 71 (2004). USA, New York, on *Liriodendron tulipifera*.

Cylindrocarpon liriodendri J.D. Macdon. & E.E. Butler, *Plant Disease* 65: 156 (1981). USA, California, from diseased roots of *Liriodendron tulipifera*.

Ectostroma liriodendri (Kunze) Fr., *Syst. mycol.* (Lundae) 2: 602 (1823), *Xyloma* Kunz.*Litt. Schwein.* N. 290. Germany, Italy, Gallia, Austria, Belgium, Lusitania and USA, on leaves of *Liriodendron tulipifera*. Synonym: *Xyloma liriodendri* Kunze, *Schr. naturf. Ges. Leipzig* 1: 55 (1822).

Fontanospora alternibrachiata Dyko, *Trans, Br. mycol. Soc.* 70: 412 (1978). USA, North Carolina, on rotten leaves of *Liriodendron*.

Fumago vagans Pers., *Mycol. eur.* (Erlanga) 1: 9 (1822). Europe, USA, Asia, on living leaves of *Liriodendron*.Current name: *Leptoxyphium fumago* (Woron.) R.C. Srivast.

Helicomyces bellus Morgan, *North American Helicospore*: 42 (1892). USA, on wood of *Liriodendron*.

Oospora tulipiferae Ellis & G. Martin, *Amer. Nat.*: 1004 (1882). USA, Pensylvania, West Chester and Bethlehem, on leaves of *Liriodendron*.

Passalora liriodendri (Ellis & Harkn.) U. Braun & Crous, in Crous & Braun, *CBS Diversity Ser.* (Utrecht) 1: 253 (2003). USA, New Jersey, Vineland, on leaves of *Liriodendron tulipifera*. Current name: *Phaeoisariopsis liriodendri* (Ellis & Harkn.) Morgan-Jones.

Phaeoisariopsis liriodendri (Ellis & Harkn.) Morgan-Jones, *Mycotaxon* 4: 493 (1976). USA, New Jersey, Vineland, on leaves of *Liriodendron tulipifera*. Synonyms: *Cercospora liriodendri* Ellis & Harkn., *Passalora liriodendri* (Ellis & Harkn.) U. Braun & Crous.

Ramularia liriodendri Ellis & Everh., *Journ. Myc*,: 2 (1888). USA, Delaw, Faulkland, on leaves of *Liriodendron tulipifera*, in, associated with *Gloeosporium liriodendri*.

Septonema caespitosum Berk. & M.A. Curtis, *North American Fungi* n. 516. USA, Carolina, on leaves of *Liriodendron*.

Septonema punctiforme Berk. & M.A. Curtis, *North American Fungi* n. 515. USA, Carolina, on leaves of *Liriodendron*.

Sporidesmium sarcinula Berk. & M.A. Curtis, *North American Fungi* n. 526. USA, Pensylvania, on wood dealbato of *Liriodendron*.

Sporotrichum incarnatum Schwein., *Syn. Amer. bor.* n. 2529 (1832). USA, Bethlehem, on decayed and soft wood of fallen branches of *Liriodendron*.

Stigmina liriodendri Ellis & Everh., *North Am. Fung. in Proceed. Acad. S. N. Philad*.: 171 (1893). USA, Mississipi, on wilt leaves of *Liriodendron tulipifera*.

Torula inquinans (Schwein.) Sacc., *Oidium inquinans* Schwein. *Syn. Amer. bor.* n. 2751 (1886), *Trichoderma globosum* Schwein. *Syn. Car.*: 77. USA, Carolina, on dead branches of *Liriodendron*.

Trichoderma globosum Schwein., *Car.* n. 524 (1822). USA, on dead branches of *Liriodendron*..

Trimmatostroma liriodendri G.F. Atk., *Ann. Mycol.* 6: 60 (1908). USA, North Carolina, Block Mts., Mitchell Mountain, on wilt leaves of *Liriodendron tulipifera*.

Xyloma liriodendri Wallr. *Saccardo's Syll. fung*. 8: 763 (1889). Germany, Italy, botanical garden, on leaves of *Liriodendron tulipifera*. Synonym: *Rhytisma liriodendri* Wallr.

Myxomycetes

Licea biforris Morgan, *Myxom. Miam. Vall., Ohio*: 5. London and Canada, .on inner bark of *Liriodendron*.

Magnolia (*Talauma*)

Ascomycetes

Acanthostigma berenice (Berk. & M.A. Curtis) Sacc., *North Am. Fungi* n. 900 (1883). USA, on leaves sheet of *Magnolia macrophyllae*. *Sphaeria berenice* Berk. & M.A. Curtis

Acanthostigma saccardioides (Ellis & G. Martin) Sacc., *Am. Nat.*: 60 (1884). USAOn living leaves of *Magnolia glauca*, New Florida, North . *Venturia saccardioides* Ellis &Mart.

Alternaria tenuissima f. sp. *magnoliicola* T.Y. Zhang & X.L. Ma, *Mycotaxon* 72: 433-441 (1999). Taiwan, Shandong, Jinan, on leaf spots of *Magnolia denudate*.

Antennaria semiovata Berk. & Broome, *North American Fungi* n. 4017, *Ann. Mag. nat. Hist.*, Ser. 2: no. 784 (1854). Alabama, Beaumont on *Magnolia glauca*. Synonym: *Catenuloxyphium semiovatum* (Berk. & Broome) S. Hughes.

Anthostoma hypophlaeum (Berk. & Ravenel) Sacc., *North Am. Fungi* 852 (1882). USA, Carolina, on rotten branches of *Magnolia glauca*. = *Cryptosphaeria* Ces. & De Not. (1863) [nom. cons.] *Diatrype hypophlaea* B. & Rav.

Anthostomella magnoliae Ellis & Everh., *Journ. Myc.* 4: 122 (1888). USA, Louisiana, St. Martinsville, on fallen leaves of *Magnolia*.

Apiognomonia tiliae var. *magnoliae* M.E. Barr, *Mycologia Memoir* 7: 28 (1978). USA, Massachusette, on overwintered leaves of *Magnolia soulangeana*. Synonym: *Apiognomonia magnoliae* (M.E. Barr) M.E. Barr, *Mycotaxon* 41: 287-305 (1991).

Apiosporium erysiphoides Sacc. & Ellis, *Michelia* 2: 566. New Jersey, Newfiled, on bark of *Magnolia glaucae*.

Asterina comata Berk. & Ravenel, *North Am. Fungi* 791. Florida, Santee Canal, Alabama, on leaves of *Magnolia glauca* and *M. grandiflora*.

Asterina drimidicola Hansf., *Proc. Linn. Soc. N.S.W.* 79: 109 (1954). Australia, New South Wales, on leaves of *Drimys* = *Magnolia* [as *Drimis*] *insipida*.

Belonidium phlegmaceum (Ellis) Sacc., *Torr.Cl.*: 19 (1882). USA, New Jersey, on fallen trunk of *Magnolia*.= *Lachnum* Retz. (1779) *Tapesia phlegmaceum* Ellis

Bionectria gibberosa Schroers, *Studies in Mycology* (Baarn & Delft, Netherland: CBS) 46: 198 (2001). Florida, on leaves of *Magnolia*. Anamorph: *Clonostachys* cf. *setosa*.

Botryosphaeria bérengeriana De Not., *Sfer. ital.* 82, *Sacc. Myc. Ven. Spec.*: 116. Gallia, Germany, Lusitania, USA, Australia, on bark of *Magnolia grandiflora* branches. Current name: *Botryosphaeria ribis* Grossenb. & Duggar.

Botryosphaeria bérengeriana var. *magnoliae* L.A. Kantsch., *Morbi plant. Leningrad* 17: 87 (1928). Georgia, on dead branches of *Magnolia grandiflora*.

Bulbomicrosphaera magnoliae A.Q. Wang, *Acta mycological Mycological Sinica* 6: 74 (1987). China, Jiangxi Province, on leaves of *Magnolia liliflora*.

Calonectria daldiniana De Not., *Comm. Soc. crittog. Ital.* 2: 477 (1867). Italy, Locarno, on fallen leaves of *Magnolia grandiflorae*.

Calyculosphaeria tristis (Fuckel) Fitzp., *Mycologia* 15(2): 48 (1923). On *Magnolia grandiflora*. Current name: *Acanthonitschkea tristis* (Pers.) Nannf.

Campsotrichum circinatum Berk. & M.A. Curtis, *Fungi N. Pac. exp.* n.144 and *North American Fungi* n. 688 (1875). Insula Bonin and Carolina, on leaves of *Magnolia grandiflora*. = *Myxotrichum* Kunze (1823).

Campsotrichum ehrenbergii Corda, *Icon.* 4: 28 (1840). Philippines, Luzon, on coriaceous leaves, probably of *Magnolia*.

Campsotrichum tenue Berk. & M.A. Curtis, *North American Fungi* n. 689 (1875). USA, Carolina, on leaves of *Magnolia grandiflora*.

Capnodium pelliculosum Berk. & Revenel, *Syll.* 1: 79 (1876). USA, Carolina and Florida, on leaves of *Magnolia*, Northern USA. *C. ellisii*. Sacc. *C. pelliculosum* (p. p. in *Magnolia*), Ellis, *American Pyreno,ycete*: 51, Sacc. Syll. 9: 439. Berkeley, *Grevillea* 4: 156 (1876)

Cenangium magnoliae Berk. & M.A. Curtis., *North American Fungi* n. 766. USA, Gainesville, Darien, Alabama, on branches of *Magnolia glauca*.

Ceuthocarpon talaumae Rehm, *Ascom. Phillipp.*, in *Leaflt. of Phillipp. Bot.* 8: 2953 (1916). Philippine, Los Banos Ins, on dead leaves of *Talauma villariana*. (M.B. Raimundo).

Clypeolum talaumae Racib., *Parasit*., *Algen und Pilze Javas* 3: 35 (1900). Java, on leaves of *Talauma mutabilis*.

Coccodinium magnoliae Sawada, *Bull. Govt For. Exp. Sta., Meguro, Tokyo* 53: 154 (1952). Japan, on leaves of *Magnolia obovata*.

Cucurbitaria congesta Cooke & Ellis, *Grevillea* 6: 12 (1878). USA, New Jersey, on bark of *Magnolia*.

Curreya excavata (Cooke & Ellis) Sacc., *Dothidea excavate* Cooke & Ellis, *Grevillea* 6: 34 (1883). USA, New Jersey, on leaves (?) of *Magnolia glauca*.

Dasyscypha hystriculus (Ellis & Everh.) Sacc., *Lachnella hystricula* Ellis & Everh., *Journ. Myc.*: 99 (1888). USA, St. Martinsville, underneath leaves sheet of *Magnolia grandiflorae*.

Dasyscyphus albo-pileata (Cooke) Sacc., *Hedwigia*: 82 (1875). USA, New Jersey, on leaves of *Magnolia*. *Peziza albo-pileata* Cooke.

Dermatella magnoliae (Berk. & M.A. Curtis.) Seaver, *The North American Cup-Fungi* (*Inoperculates*): 43314 (1951). Basionymn: *Cenangium magnoliae* Berk. & M.A. Curtis.). = *Dermea* Fr. (1825).

Diaporthe (Chor.) *binoculata* (Ellis) Sacc., *Syll.* 9: 708. var. *magnoliae-acuminatae* Peck, 44 Rep.: 28. On branches of *Magnolia acuminatae*, Carrollton, Northern USA.

Diaporthe (Chor.) *magnoliae* Ellis. & Everh., *North Am. Pyr.*: 433. USA, New Jersey, New Field, on dead branches of *Magnolia glauca*.

Diaporthe americana Speg., *Michelia* 1: 457 (1879). Italy, Susegana, on dead branches of *Magnolia grandiflora*.

Diaporthe chorostate binoculata (Ellis) Sacc., *Valsa binoculata* Ellis *Torr. Bot. Cl.*: 111 (1882). USA, New Jersey, on dead trunk of *Magnolia glauca*.

Diaporthe magnoliae Ellis & Everh., annotation = *Diaporthe eres* Nitschke fide Wehmeyer, *The genus Diaporthe and its segregates*. Univ. Mich. Stud. Sci. Ser. 9: 95 (1933), Sydowia 7: 104 (1953) on *Magnolia glauca.*

Diatrype americana Ellis & Berl., *Ic. fung.* 3: 94. USA, North Carolina and New Jersey On branches of *Magnolia*.

Diatrype disciformis var. *magnoliae* Thüm., USA, New Field, on branches of *Magnolia glauca*.

Diatrype durieui Mont., *Syll. Crypt.* 748 Fl. Alg.: 405. Sub *Sphaeria.* Carolina, New Jersey, on bark of *Quercus mirbeckii*, La Calle (Durieu), *Quercus*, *Magnolia* and *Aceris*.

Diatrype microstoma var. *minor* Sacc., *Ann. Mycol.* 11: 314 (1913). Japan, Mino province, on bark of *Magnolia* branches.

Diatrype minima Ellis & Everh., *Journ. of Myc.*: 91 (1885). USA, Newfield, on branches of *Magnolia glauca*.

Diatrype sphaerospora Ellis & Everh., *Journ. Myc.*: 42 (1887). On dead branches of *Magnolia glaucae*, Newfiled, New Jersey.

Didymella magnoliae A.C. Santos & Sousa da Câmara, *Agron. Lusit.* 16: 177 (1954). Portugal, on *Magnolia grandiflora*.

Didymosphaeria magnoliae J.H. Mill. & G.E. Thomps., *Mycologia* 32: 12 (1940). USA, Georgia, on *Magnolia virginiana*.

Dilophia magnoliae Ellis & Everh., *Bull. Torr. Bot. Cl.*: 131 (1897). USA, West Virginia, on trunks of *Magnolia fraseri* (Nuttall) .= *Lidophia* J. Walker & B. Sutton (1974).

Dimerosporium caerulescens Rehm, *Hedwigia*:: 152 (1901). Brazil, on leaves? of *Tatauma*. = *Asterina* Lév. (1845).

Dimerosporium magnoliae Tracy & Earle, *Bull. Torr. Bot. Club.*: 175 (1895). USA, Mississipi, on living leaves of *Magnolia virginiana*. Synonym: *Dimerium magnoliae* (Tracy & Earle) Sacc. & P. Syd. (1905).

Elsinoë magnoliae J.H. Mill. & Jenkins, *Mycoogia* 47: 104 (1955). USA, on *Magnolia grandiflora*.

Erysiphe magnoliae (Sawada) U. Braun & S. Takam., *Schlechtendalia* 4: 10 (2000). On *Magnolia obovata*. Synonym: *Microsphaera magnoliae* Sawada, *Bull. Gov. Forest Exp. Sta*. 50: 120 (1951).

Eutypella monticulosa (Berk. & M.A. Curtis) Sacc., *Cooke Valsei of Un. St.* 112 (1882). USA, Carolina, on branches of *Magnolia glauca*. *Valsa monticulosa* Berk. & M.A. Curtis,

Eutypella tiflisiensis Rehm, *Ascom. exsicc. fasc.*55, n. 2110., *Ann. Mycol.* 12: 171 (1914). Caucasus, Kutais Ossurgetia province, on dead trunk of *Magnolia grandiflora*.

Gnomonia magnoliae Ellis, *Am. Nat.*: 318 (1883). USA, New Jersey, Newfield, on fallen leaves of *Magnolia glauca*.

Guignardia magnoliae (Schwein.) J.H. Mill., *Mycologia* 33: 81 (1941). USA, Philadelphia and New Jersey, near Kaign's Point, on back of *Magnolia glauca* leaves. Synonym: *Sphaeria magnoliae*.

Guignardia moelleriana Sousa da Câmara, *Bol. Soc. Broteriana* 25: *Extr.*: 6 (1910). Coimbra Lusitania Botanical Garden, on leaves of *Magnolia* sp.

Haplosporella grandinea Ellis & Everh., annotation see sylloge fungorum 18: 316 (1906). Repert. Spec. Nov. Regni Veg. Beih. 42: 68 1927 (1926). On *Magnolia acuminata*.

Haplosporella grandinea Ellis & Everh., *Journ. of Mycol.*: 63 (1902). USA, Alabama, on branches of *Magnolia glauca*.

Haplosporella mexicana Ellis & Everh., *Bull. Torr. Bot. Club.*: 440 (1895). Mexico On dead trunk of *Magnolia mexicanae*.

Hercospora binoculata (Ellis) Höhn., *Mitt. Bot. Lab. Tech. Hochschule Wien* 3: 19 (1926). On *Magnolia glauca.* Synonym: *Diaporthe binoculata* Ellis.

Hercospora magnoliae-acuminatae (Peck) Höhn., *Mitt. Bot. Lab. Tech. Hochschule Wien* 3: 20 (1926). On *Magnolia glauca.* Synonym: *Diaporthe binoculata* var. *magnoliae-acuminata* Peck.

Homostegia magnoliae (Cooke) Sacc., *Saccardo's Syll. fung.* (Abellini) 2: 650 (1883). *Dothidea magnoliae* Cooke. *Grevillea* 7: 50. USA, Carolina, Darien, on leaves of *Magnolia*. Synonyms: *Dothidea magnoliae* Cooke, *Grevillea* 7: 50 (1878), *Phyllachora magnoliae* (Cooke) Cooke, *Grevillea* 13: 70 (1885).

Hypocrea corticola Ellis & Everh., *Journ. of Myc.*: 140 (1885). USA, on dead branched wood of *Magnolia glauca*. Current name: *Hypocrea corticiicola* Ellis & Everh.

Hypocrea minima Sacc. & Ellis, *Michelia* 2: 570. USA, New Jersey, Newfield, on bark of *Magnolia*.

Hyponectria magnoliae (Schwein.) M.E. Barr, *Mycologia* 69: 959 (1977). USA, Philadelphia, Kaign's Point and New Jersey, on back of *Magnolia glauca* leaves..

Hypoxylon annulatum (Schwein.) Mont., *Syll. Crypt.*: 213. On bark and wood of *Quercus* and *Magnolia*, in Carolina, Georgia, Florida, Chili and New Zealand. Current name: *Annulohypoxylon annulatum* (Schwein.) Y.M. Ju, J.D. Rogers & H.M. Hsieh.

Hypoxylon epiphaeum Berk. & M.A. Curtis, *North Am. Fungi* 843 (1875). USA, New Jersey, Carolina, on bark of *Magnolia glauca*. Current name: *Hypoxylon monticulosum* Mont.

Hypoxylon nuttallii Ellis & Everh., *Proc. Acad. Phil.*: 346 (1894). USA, West Va, Nuttallburg, on dead bark of *Magnolia fraseri*. Current name: *Hypoxylon monticulosum* Mont.

Laestadia magnoliae (Schwein.) Sacc., *Syn. North Amer. bor.* n. 1808. USA, Philadelphia, New Jersey, near Kaign's Point, on back of *Magnolia glauca* leaves. *Sph*. (foliicola) *magnolia* Schwein., Basionym: *Sphaerella magnoliae* Ellis (*Sphaeria magnoliae*).

Lasiosphaeria subvelutina Ellis & Everh., *Journ. Myc.*: 117 (1877). USA, Newfield, on decayed wood of *Magnolia*.

Leptomassaria americana Petr., *Sydowia* 7: 121 (1953). USA, Maryland, forest vic. Beltsville, on dead branches of *Sassafras* or *Magnolia*,

Leptosphaeria magnoliae Woron., *Vest. tiflis. bot. Sada* 35: 4 (1915). USSR, On leaves of *Magnolia grandiflora*.

Leptosphaeria yulan Sacc., *Fungi Ven. Ser.* 2: 312, Fungi ital. Italy, garden, Selva (Treviso), on wilt leaves of *Magnolia yulan*.

Leptothyrella langloisii (Ellis & Everh.) Sacc., *Journ. Myc.*: 152 (1889). USA, Louisiana, on living leaves of *Magnolia grandiflora*. *Asterinula langloisii* Ellis & Everh.

Massaria magnoliae Ellis. & Everh., *Field Columb. Mus.* 9: 141 (1896). USA, West Virginia, on bark of *Magnolia acuminata*.

Massaria shearii Petr., *Sydowia* 6: 5 (1952). USA, Georgia, on dead *Magnolia*.

Melanopsamma nitens var. *talaumae* Rehm, *Leafl. of Philipp. Bot.* 6: 2200 (1914).

Meliola amphitricha Fr., *Syst. mycol.* (Lundae) 2: 109 (1822). Mont. Cuba USA, USA-Australia, Australia, on leaves of *Magnolia*.

Meliola diplochaeta Syd. & P. Syd., *Leaflets of Philipp. Bot.* 5: 1536 (1912). Philippine, Palawan, Puerto Princesa, on senescent leaves of *Talauma villariana*.

Meliola hoehneliana Hansf., *Sydowia*, Beih. 2: 29 (1961). On *Magnolia obovata*. Syn. *Meliola coralina* Mont. Var. *Javanica* Höhnel [non *M. javanica* Ciferri, 1951].

Meliola magnoliae F. Stevens., *Illinois. Biol. Monogr*.,(Urbana) 2(4): 55 (1916). Porto Rico, Mountain Alegrillo, on leaves of *Magnolia portoricensis*.

Meliola magnoliae var. *illicii* Cif., *Annal. Myco.* 31: 147 (1933). South Dominco, on living leaves of *Illicii parviflora*.

Meliola nashii Hansf., *Proc. Linn. Soc. Lond.* 165 (1952-1953): 174 (1955). USA, Florida, on *Magnolia virginiana*.

Meliola talaumae Hansf., *Reinwardtia* 3: 90 (1954). Borneo, Brit. North, on *Talauma*.

Menegazzia inactiva P. James & Kantvilas, in Kantvilas & James, *Lichenlogist* 19: 25 (1987). Australia, rainforest Tas., on bark of *Tasmannia lanceolata*.

Metasphaeria magnoliae (J.V. Almeida & Sousa da Câmara) Sacc., *Saccardo's Syll. fung.* 17: 695; 20: 77 (1903). Lusitania, Bemfica near Lisboa, on leaves of *Magnolia* sp. Basionym: *Sporoctomorpha magnoliae* J.V. Almeida & Sousa da Câmara

Micropeltis alabamensis Earle, *Bull. Torr. Bot. Cl.*: 359 (1898). USA, Alabama, Auburn, on living leaves of *Magnolia virginiana*.

Microsphaera magnifica U. Braun, *Mycotaxon* 16: 418 (1983). USA, Pa, on *Magnolia acuminate*.

Microsphaera magnoliae Sawada, *Bull. Govt Forest Exp. Sta., Tokyo* 50: 120 (1951). Japan, on *Magnolia obovata*.

Mollisia fumigata Ellis & Everh., *Torr. Club.*: 41 (1884). USA, New Jersey, Newfield, on rotten wood of *Magnolia*.

Mollisia glenospora Ellis & Everh. *Torr. Club.*: 38 (1881). USA, New Jersey, Newfield, on rotten trunk of *Magnolia*.

Mycosphaerella magnoliae (Ellis) Petr., *Sydowia* 5: 247 (1951). On *Magnolia glauca*. Synonym: *Sphaerella magnoliae*.

Mycosphaerella milleri Hodges & Haasis, *Mycologia* 56: 53 (1964). USA, South Carolina, on leaves of *Magnolia virginiana* and *M. grandiflora*. (*Conidia: Cercospora magnoliae* Ell. & Harkn.).

Nectria aureofulva Cooke & Ellis, *Grevillea* 7: 8 (1878). USA, New Jersey, on bark of *Magnolia*. Current name: *Bionectria aureofulva* (Cooke & Ellis) Schroers & Samuels.

Nectria conigena Peck., *Torr. Bot. Club*. USA, Newfield, on fallen cone (fruit) of *Magnolia glauca*. Current name: *Nectria conigena* Ellis & Everh.

Nectria russellii Berk. & M.A. Curtis, *North Amer. Fungi* n. 815, forma *Magnoliae* Sacc. *Michelia* 2: 140. USA, Carolina, on bark of *Magnolia*.

Nectriella microspora (Cooke & Ellis) Sacc., *Michelia* 1: 279 (1883). USA, New Jersey, on bark of *Magnolia*. Syn. *Nectria microspora* Cooke & Ellis, *Grevillea* 5. 53: 80.

Nummularia discreta (Schwein.) Tul. & C. Tul., *Select. fung. carpol.* (Paris) 2: 45 (1863). Germany, Gallia, Italy, Carolina, Alabama, New York and Cuba, on branches of *Mali*, *Sorbi*, *Cercidis*, *Magnolia* and *Ulmi*. Current name: *Biscogniauxia marginata* (Fr.) Pouzar.

Ombrophila albofusca Ellis, *Bull. Torr.*: 73 (1882). USA, New Jersey, on bark of *Magnolia glauca*.

Phomopsis viridarii (Sacc.) Traverso & Spessa, *Saccardo's Syll. fung.* (Abellini) 22: 898 (1913), sub *Phoma*. fm. *Nervicola* Trav. & Spessa, *Bol. Soc. Brot.* 25: 178 (1910). Coimbra Botanical Garden, on leaves of *Magnolia grandifera*.

Phyllachora demersa (Corda) Sacc., *Saccardo's Syll. fung.* (Abellini) 2: 595 (1883). India, Tenasserim, on leaves of Magnoliaceae.

Phyllactinia magnoliae Y.N. Yu & Lai, *Acta microbial. sin.* 19: 16 (1979). China, on leaves of *Magnolia*,. See also **P. magnoliae* Y.N. Yu & S.J. Han, *Acta microbial. sin.* 18: 115 (1978).

Phyllactinia suffulta f. *magnoliae* Jacz., *Taschenbestimmungsbuch f. Pilze.* 2. *Erysiphaceen*: 434 (1926). USA, on leaves of *Magnolia acuminate*, *M. fraseri* and *M. kobur*.

Phyllosticta magnoliae-pumilae Sawada, *Trans. nat. Hist. Soc. Formosa.* 32: 290 (1942). On *Magnolia pumila*.

Plagiostoma magnoliae (Ellis) M.E. Barr, *Mycologia Memoirs* 7: 117 (1978). USA, New Jersey, Newfield, on fallen leaves of *Magnolia glauca*. Synonym: *Gnomonia magnoliae* Ellis.

Pleomassaria magnoliae Shear, *Bull. of the Torr. Bot. Cl.*: 455 (1902). USA, Washington, on barkened branches of *Magnolia ovata*.—anamorphic state *Camarosporium magnoliae* Shear.

Pleomassaria maxima Ellis & Everh., *Bull. Torr. Bot. Cl.*: 505 (1898). USA, Massachusetts, on dead bark of *Magnolia*.

Pleospora magnoliae Massa, in Ferraris and Massa, *Ann. Mycol.* 10: 287 (1912). Italy, Firenze, on leaves of *Magnolia grandiflora*.

Plowrightia concaviuscula (Ellis & Everh.) Sacc., *North American Pyrenomycetes*: 612. USA, New Jersey, Newfield, on dead branches of *Magnolia glauca*. Basionym: *Dothidea concaviuscula* Ellis & Everh.

Pseudopeziza protrusa (Berk. & M.A. Curtis) Rehm, *Ascom.* n. 310. USA, Carolina, on leaves sheet of *Magnolia glauca*. Basionym: *Peziza protrusa* Berk. & M.A. Curtis.

Pyrenopeziza protrusa (Berk. & M.A. Curtis) Sacc., *North American Fungi* n. 745 and Cooke, *Disc. U. S.* 1: 297. USA, Carolina, on dead leaves sheet of *Magnolia glauca*. Basionym: *Peziza protrusa* Berk. & M.A. Curtis.

Pyrenula wheeleri R.C. Harris, *Some Florida Lichens* (New York): 69 (1990). USA, Florida, on *Magnolia*.

Rhytisma magnoliae Schwein., *Transactions of the Amer. Phil. Soc.*, New Series 4: 242 (1832). USA, Philadelphia, on fallen green leaves that still green of *Magnolia glauca*.

Schizoxylon floridanum Shearwood, *Mycotaxon* 6: 230 (1977). USA, Florida, on wood and bark of *Magnolia*.

Shearia magnoliae (Shear) Petr., *Annls mycol.* 22: 180 (1924). USA, Washington, on branches of *Magnolia obovata*. Basionym: *Camarosporium magnoliae* Shear.

Sphaerella annulata Cooke, *Rav. Fung. Amer.* in *Grevillea* 6: 146. USA, Carolina, Aiken, on upper sheet of dead leaves of *Magnolia*.

Sphaerella elatior var. *apula* Sacc. & D. Sacc., *Saccardo's Syll. fung.* 1: 495. On living leaves of *Magnolia grandifera*.

Sphaerella glauca Cooke, *Hedwigia*: 39 (1878). USA, Carolina, Aiken, on branches of *Magnolia acuminate* and on leaves of *Magnolia glauca*.

Sphaeronaemella rufa (Fr.) Sacc., *Saccardo's Syll. fung.* (Abellini) 3: 618 (1884). USA and Suecia, on wood of *Pinus* in accordance with *Magnolia* and *Clethra*.Basionym: *Sphaeria rufum* Fr.

Sphaerostilbe flammea var. *pallida* (Berk. & M.A. Curtis) Sacc., *Saccardo's Syll. fung.* (Abellini) 2: 512 (1883). USA, Carolina, on *Magnolia glauca*. Basionym: *Atractium pallidum* Berk. & M.A. Curtis.

Splanchnonema clandestinum M.E. Barr, *Mycotaxon* 15: 362 (1982). USA, Pensylvania, on branches of *Magnolia acuminata*.

Trichosphaeria barbicincta (Ellis & Everh.) Sacc., *Saccardo's Syll. fung.* (Abellini) 9: 603 (1891). USA, New Jersey, Newfield, on an old established of *Diatrype tremellaphora* and bark of adjacent of *Magnolia*. Basionym: *Byssosphaeria barbicincta* Ellis & Everh. Current name: *Chaetosphaeria barbicincta* (Ellis & Everh.) M.E. Barr.

Tympanis magnoliae J.W. Groves, *Canad. J. Bot.* 30: 618 (1952). USA, New Jersey, on *Magnolia*.

Valsaria magnoliae Ellis & Everh., *Journ. of Mycol.*: 170 (1904). Canada, London, on dead trunks of *Magnolia*.

Venturia applanata Ellis & G. Martin, *Am. Nat. Bot.*: 69 (1884). USA, New Florida, on living leaves of *Magnolia glauca*.

Venturia saccardioides Ellis & G. Martin, *Am. Nat.*: 69 (1884). USA, New Florida, on living leaves of *Magnolia glauca*.

Xylaria jaliscoensis F. San Martín, J.D. Rogers & Y.M. Ju, in Rogers, San Martín & Ju, *Sydowia* 54: 95 (2002). Jalisco, on fallen fruits of *Magnolia iltisiana*.

Xylaria magnoliae J.D. Rogers, *Canad. J. Bot.* 57: 941 (1979). USA, Tennessee, on fruit of *Magnolia*. Current name: *Xylaria magnoliae* var. *magnoliae*.

Xylaria magnoliae var. *microspora* J.D. Rogers, Y.M. Ju & Whalley, In Rogers, San Martín & Ju, *Sydowia* 54: 96 (2002). Thailand, on fallen fruits of *Magnolia*.

Zignoëlla magnoliae Tracy & Earle, *Bull. Torr. Bot. Cl.*: 211 (1896). USA, Mississippi, on dead bark of *Magnolia glauca*.

Zignoëlla magnoliae var. *brasiliensis* Rehm, *Hedwigia*: 106 (1901). Brazil, Rio de Janeiro, on climbing twig next to *Zignoëlla magnoliae*.

Basidiomycetes

Amanita verrucosivolva Zhu L. Yang, *Bibliotheca Mycologica* 170: 111 (1997). Yunnan, on soil in subtropical forest with *Castanopsis*, *Lithocarpus* and *Magnolia*.

Apiosporium erysiphoides Sacc. & Ellis, *Michelia* 2: 566. USA, New Jersey, Newfield, on bark of *Magnolia glauca*.

Boletus heterodermus Singer, *Fieldiana Botany, New Series* 21: 124 (1989). Costa Rica, on soil under *Magnolia* and Lauraceae in tropical montane forest.

Campanella floridana Singer, *Lloydia* 13: 249 (1951). USA, Florida, on dead *Magnolia grandiflora*..

Cerinomyces ceraceus Ginns, *Canad. J. Bot.* 60: 519 (1982). USA, Miss., on bark of rotten branches of *Magnolia grandiflora*.

Clavaria molaris Berk., *Grevillea* 7: 5. USA, New Jersey, .Newfiled**,** on dead branches of *Magnolia glauca*. Current name: *Clavaria molaris* Berk. ex Cooke & Ellis.

Corticium leptaleum Ellis & Everh., in Millspaugh & Nuttall, *Publications of the Field Columbia Museum*, Bot. series 9: 170 (1896). USA, West Virginia, on trunks of *Magnolia fraseri*. . Current name: *Hyphoderma leptaleum* (Ellis & Everh.) Ginns.

Corticium subgiganteum Berk., *North Amer. Fung.* n. 277 and *Grevillea* 2: 3 (1873). USA, On *Magnolia glauca*. Current name: *Licrostroma subgiganteum* (Berk.) P.A. Lemke.

Glenospora curtisii Berk. & Desm., *North American Fungi* n. 1002, *Grevillea* 4: 161 (1876). USA, on living bark of *Magnolia*. Current name: *Septobasidium curtisii* (Berk. & Desm.) Boedijn & B.A. Steinm.

Hapalopilus subrutilans Murril, *Bull. Torrey bot. Club* 65: 655 (1938). USA, Florida, on *Magnolia glauca*. Current name: *Wrightoporia subrutilans* (Murrill) Ryvarden.

Hydnum ciliolatum Berk. & M.A. Curtis, *Hooker's J. Bot. Kew Gard. Misc.* 1: 235 (1849). USA, Carolina, on trunk of *Magnolia glauca*. Current name: *Steccherinum ciliolatum* (Berk. & M.A. Curtis) Gilb. & Budington.

Hydnum fuscoatrum Fr., *Syst. Myc.* 1*:* 416. *Hym. Eur.*: 612, *Weinm. Ross.*: 364, *Nov. fl. svec.* 2: 39 (1814). USA, Carolina, on trunk of *Magnolia*. Current name: *Mycoacia fuscoatra* (Fr.) Donk.

Hymenochaete corticolor Berk. & Ravenel, *Rav.Fasc.* 3: 30 and *North Amer. Fungi* n. 244, *Grevillea* 1: 165 (1873). USA, Florida, on *Magnolia gainesville*. Current name: *Hymenochaete cervina* Berk. & M.A. Curtis.

Hypochnus rubrocinctus Ehrenb., *Sylv. mycol. berol.* (Berlin): (1818). . Brazil, Surinum, Venezuela, USA, Cuba, Australia, on corticibus of *Magnolia*. Current name: *Cryptothecia rubrocincta* (Ehrenb.) G. Thor.

Laccaria gomezii Singer & G.M. Muell., in Mueller & Singer, *Mycotaxon* 33: 224 (1988). Costa Rica, found under *Quercus* and *Magnolia*.

Lachnella virginica Ellis & Everh., *Proc. Acad. Phil.*: 349 (1894). USA, Virginia, on dead wood of *Magnolia fraseri*.

Lazulinospora cinnamomea Burds. & Nakasone, *Mycologia* 73: 464 (1981). USA, Florida, on *Magnolia*.

Lepiota baraliana Raithelh., *Metrodiana* 13: 33 (1986) [1984]. Germany, found under *Quercus* and *Magnolia*.

Marasmius bombycirrhizus Berk. & Cooke, *Grevillea*. USA, Florida, Gainesville, found near the fallen cone of *Magnolia grandiflora*.

Marasmius magnoliae Singer, *Mycologia* 37: 435 (1945). USA, Florida, on petioles of fallen leaves of *Magnolia grandiflora*.

Melampsoridium inerme Suj. Singh & P.C. Pandey, *Trans. Br. mycol. Soc.* 58: 342 (1972). India, West Bengal, on leaves of *Magnolia campbellii*.

Phanerochaete magnoliae (Berk. & M.A. Curtis) Burds., *Mycol. Mem.* 10: 95 (1985). USA, Carolina, on smooth bark of *Magnolia glauca*. Basionym: *Radulum magnoliae* Berk. & M.A. Curtis.

Phellinus obliquus var. *antillarum* Pat., in Duss, *Enum. Methodique des champignons recueilles a la Guadeloupe a la Martinique* (Lons-le-Saunier): 32 (1903). Guadeloupe and Martinique, on *Talauma plumieri* and on dead wood.

Radulum magnoliae Berk. & M.A. Curtis, *North Am. Fungi* n. 203, *Hooker's J. Bot. Kew Gard. Misc.* 1: 236 (1849). USA, Carolina, on smooth bark of *Magnolia glauca*. Current name: *Phanerochaete magnoliae* (Berk. & M.A. Curtis) Burds.

Rhodocybe brunnescens T.J. Baroni & E. Horak, *Mycologia* 86: 140 (1994). Tennessee, under *Fagus grandifolia*, *Betula allghaniensis*, *Acer saccharum* and *Magnolia acuminata*.

Russula delica var. *centroamericana* Singer, *Fieldiana Botany, New Series* 21: 128 (1989). Costa Rica, on soil in *Quercus* and *Magnolia* tropical montane forest.

Russula subcrustosa L.D. Gómez & Singer, *Revista de Biología Tropical* 44 (Suppl. 4): 29 (1996) (1997). Costa Rica, in mixed woodland of *Quercus*, *Magnolia*, *Hedyosmum* and *Lauraceae*.

Schizophyllum egelingianum Ellis & Everh., *Bull. Torrey bot. Club* 22: 439 (1895). Mexico, on trunk of *Magnolia mexicana*.

Sebacina cinnamomea Burt., *Thel. North American*, in *Ann. Miss. Bot. Gard.* 2: 763 (1915). USA, Maryland, on fallen branches of *Magnolia glauca*.

Tylopilus montanus Singer, *Fieldiana Botany, New Series* 21: 126 (1989). Costa Rica, on soil in tropical montane forest of *Quercus* and *Magnolia*.

Veloporphyrellus pantoleucus L.D. Gómez & Singer, *Brenesia* 22: 293 (1984). Costa Rica, on soil in montane forest of *Quercus* and *Magnolia*.

Volvaria flaviceps Murrill, *Mycologia* 41: 490 (1949). USA, Florida, on log of *Magnolia*.

Coelomycetes

Actinothyrium magnoliae Schwein., *Syn. Amer. bor.* n. 2177, *Sylloge Fungorum* 3: 658 (1884). USA, Philadelphia, on back of leaves sheet of *Magnolia glauca*.

Ascochyta magnoliae Thüm., *Contr. F. Litor.* n. 342, *Sylloge Fungorum* 3: 384 (1884). Italy, Monastero near Aquileja, on dead leaves of *Magnolia grandiflora*.

Bartalinia nervisequa Tassi, *Bull. Lab. Ort. Bot. Siena* 1900: 127. Italy, Viareggio, on leaves of *Magnolia grandiflora*.

Botryodiplodia magnoliicola (Siemaszko) Petr., *Repert. Spec. Nov. Regni Veg. Beih.* 42: 143, 1927 (1926). On *Magnolia grandiflora*. Basionym: *Sphaeropsis magnoliicola* Siemaszko.

Camarosporium magnoliae Grove, *British Stem- and Leaf-fungi* (*Coelomycetes*) 2: 362 (1937). UK, on leaves of *Magnolia grandiflora*.

Camarosporium magnoliae Shear, *Bull. of the Torrey bot. Club*: 455 (1902). USA, Washington, on branches of *Magnolia obovata*.

Camarosporium nervisequum Tassi, *Bull. Lab. Ort. Bot. Siena*: 19 (1900). Italy, Senensi, Botanical Garden, on leaves of *Magnolia pumila*.

Camarosporium pulchrum Woron., *Monit. Jard. Botanique Tiflis* 28: 24, *Saccardo's Syll. fung*. 25: 400 (1913). Caucaso, Tiflis, on spot of *Phyllosticta magnoliae* Sacc. On living leaves of *Magnolia grandiflora*.

Colletotrichum magnoliae Sousa da Câmara, *Myc. novi mycofl. Lusitan.*, in *Revista agronom., Lisboa*: 8, *Saccardo's Syll. fung*. 25: 572 (1920). Lusitania, Sintra province, on leaves of *Magnolia grandiflora*.

Coniothyrium magnoliae (Westend.) Sacc. & Traverso, *Saccardo's Syll. fung.* 19: 400. (1910). Belgium, on leaves of *Magnolia grandifera*. Basionym: *Monoplodia magnoliae* Westend.

Coniothyrium olivaceum Bonord., in Fuckel, *Symbolae mycologicae*: 377 (1869), *Saccardo's Syll. fung*. 3: 305 (1884) . USA, Lusitania, Germany, Italy, Gallia, Australia, on branches of *Magnolia grandiflora*.

Coniothyrium olivaceum var. *magnoliae-grandiflorae* Sacc., *Saccardo's Syll. fung*. 3: 306 (1884). USA, Lusitania, Germany, Italy, Gallia, Australia, on branches of *Magnolia grandiflora*.

Cytospora magnoliae Sandu, in Sandu-Ville *et al*., *Stud. Cercet. ŞStiinţ., Iaşsi, Biol. ŞStiinţte agric.* 13: 261 (1962). Romania, on dry branches of *Magnolia youlani*.

Cytospora tumulosa Ellis & Everh., *Bull. Torr. Bot. Cl.*: 288 (1897), *Saccardo's Syll. fung*. 14: 914 (1899). USA, West Virginia, on dead branches of *Magnolia fraseri*.

Depazea glauca Cooke, in Ravenel, *Fung. Amer.* n. 93. (sub *Septoria*), *Saccardo's Syll. fung*. 3: 64 (1884). USA, Gainesville, on leaves of *Magnolia glauca*.

Diplodia magnoliae Westend., *Bull.Soc. R. bot. Belg*., *sér*. 2 12: 7 (1857). Italy and Belgium, in garden, on twig leaves of *Magnolia grandiflora*.

Diplodia magnoliicola Brunaud, *Bull. Soc. Bot. Fr.*: 224 (1893). Saintes Galliae, on dead branches of *Magnolia grandiflora*.

Diplodia punctipetiola Cooke, *Grevillea*. Carolina, Aiken, on petioles of *Magnolia grandiflora*.

Diplodia ravenelii Cooke, *Grevillea*. Australia, Carolina, Aiken, on leaves of *Magnolia*.

Discosia alnea (Pers.) Berk., *Outl.*: 318. USA, Suecia, Germany, UK On living, wilt leaves of *Magnolia*. Basionym: *Xyloma alneum* Pers.

Discosia artocreas (Tode) Fr., *Summa veg. Scand.*, Section Post. (Stockholm): 423 (1849). Germany, UK, Italy and USA, Gallia, on leaves of *Magnolia.*

Discula magnoliae (Berk. & M.A. Curtis.) Sacc., *North Amer. Fungi.* n. 468. USA, Virginia, on branches of *Magnolia cordata*. *Discella magnoliae* Berk. & M.A. Curtis,.

Dothidasteromella magnoliae (Tracy & Earle) M.L. Farr, *Sydowia* 38: 67 (1986) [1985]. Basionym: *Dimerosporium magnoliae* Tracy & Earle 1896.

Dothiorella macrospora (Berk. & M.A. Curtis) Sacc., *North Amer. Fungi* n. 413 (1884). Alabama, on branches of *Magnolia glauca*. Basionym: *Sphaeropsis macrospore* Berk. & M.A. Curtis.

Entelexis magnoliae Van der Walt & Johannsen, *Antonie van Leeuwenhoek* 39: 646 (1973). South Africa, in culture from a pear blossom, (Conidia: *Torulopsis magnoliae* Lodder & Creger van Rij).

Entosordaria magnoliae (Ellis & Everh.) Höhn., *Sitzb. Acad. Wiss. Wien*, *Math. Naturw. Kl.,Abt* 1, 129 Bd.: 166 (1920). Basionym: *Anthostomella magnoliae* Ellis & Everh.

Fusicoccum nervicolum Ellis & Everh., *Bull. Torr. Bot. Cl.*: 509 (1898). USA, West Virginia, on fallen senescent leaves of *Magnolia fraseri*. Current name: *Fusicoccum nervicola* Ellis & Everh.

Gloeosporium haynaldianum Sacc. & Roum., *Reliq. Libert.* 4, n. 174 (1884). Arduennis, on leaves of *Magnolia grandiflora*, with ochre-coloured spot.

Gloeosporium magnoliae Pass., *Atti della Reale Accademia dei Lincei*, *Memorie di Classe di Scienze Fisiche, Matematiche* 6: 468 (1890). Italy, Parma, on living leaves of *Magnolia fuscata*. Current name: *Glomerella cingulata* (Stoneman) Spauld. & H. Schrenk.

Haplosporella grandinea Ellis & Everh. *Journ. of Mycol.*: 63 (1902). USA, Alabama, on branches of *Magnolia glauca*. Current name: *Aplosporella grandinea* Ellis & Everh.

Hendersonia magnoliae var. *chimonanthi* Sacc. & Scalia, *Fl. myc. Lus.* 12: 11 (1903). Lusitania, Coimbra, on living leaves of *Chimonanthi fragrantis*.

Hendersonia magnoliae var. *magnoliae* Sacc., *Michelia* 1: 216 (1878). Gallia, Italy and Perpignan, Treviso, on wilt leaves of *Magnolia grandiflorae*.

Ischnostroma merrillii Syd. & P. Syd., *Philipp. J. Sci.*, C, Bot. 9 (1914). Philippine, Palawan, Lake Manguao, on living leaves of *Talauma* sp.

Leptostroma maculicolum Hilitzer, *Monograf. Stud. Cesk. Druz. Hysteriales*: 78 (1929). Europe, on dead leaves of *Magnolia*. Current name: *Leptostroma maculicola* Hilitzer.

Leptothyrium magnoliae Sacc., *Fl. Myc. Lus*. 12: 13 (1903). Coimbra Lusitania, Botanical garden, on dead leaves of *Magnolia grandiflora* var. *affinis*.

Macrophoma ilicella f. *Magnoliae magnoliae* Sacc., *Contrib. Flor. Mycol. Lusitan.* 12: 8 (1903). Coimbra Lusitania, Botanical Garden, on dead leaves of *Magnolia grandiflora*.

Macrophoma magnoliae Sawada, *Rep. Govt Res. Inst. Formosa* 85: 70 (1943). Formosa, on *Magnolia pumila*.

Melanconium magnoliae Ellis. & Everh., *Journ. Myc.* 7: 133 (1892). USA, New Jersey, Newfield, on dead branches of *Magnolia glauca*.

Melanconium monotospora (Cooke) Sacc., *Grevillea*. Carolina, on wood of *Magnolia glauca*. *Stilbospora monotospora* Cooke.

Microdiplodia magnoliae Grove, *Brit. Stem- and Leaf-fungi* (*Coelomycetes*) 2: 362 (1937). UK, on dead leaves of *Magnolia grandiflora*.

Microdiplodia punctifolia (J.V. Almeida & Sousa da Câmara) Sacc., *Revista agronomica* 3: 92 (1903). Lusitania, Lisboa, on living leaves of *Magnolia* sp. Basionym: *Diplodia punctifolia* J.V. Almeida & Sousa da Câmara.

Microdiplodia solitaria Bubàk, *Ann. Mycol.* 12: 208 (1914). Venetia trident, Arco, on living leaves of *Magnolia grandiflora*.

Monoplodia magnoliae Westend., *Bull. Acad. R. Sci. Belg.*, sér. 2: 7 (1859). Belgium, on leaves of *Magnolia grandifera* .

Naemosphaera magnoliae (Peck) Höhn., *Mitteil. Bot. Lab. Techn. Hochsch. Wien* 3: 19 (1926). Synonym: *Sphaeronaema magnoliae* Peck.

Naemospora rufa Berk. & M.A. Curtis, *North Amer. Fungi* n. 494. USA, on branches of *Magnolia*.

Pestalotiopsis magnoliae J.M. Yen, *Bull. trimest. Soc. mycol Fr.* 96: 31 (1980). On leaves of *Magnolia*, Hong Kong.

Pestalozzia guepini Desm., *Annls. Sci. Nat.*, Bot.,14: 182 (1840). Italy, Belgium, Anglia, Australia and USA, on leaves of *Magnolia*. Current name: *Pestalotiopsis guepinii* (Desm.) Steyaert [as '*guepini*'].

Phoma atomispora Cooke, *Grevillea* 12: 22 (1883). Carolina, Australia, on petiole of *Magnolia*.

Phoma ilicis var. *magnoliae* Sacc., *Exs.* n. 1290, *Kickx Fl.* 1*:* 440. Gallia, on wilt leaves of *Magnolia grandiflorae*.

Phoma magnoliicola Syd. & P. Syd., *Hedwigia*: 2 (1900). Germany, Berolinensi, Botanical Garden, on dead branches of *Magnolia tripetala*. Current name: *Phomopsis magnoliicola* (Syd. & P. Syd.) Died.

Phoma melaleuca Berk. & Cooke, *North Amer. F.* n. 387. USA, on leaves of *Berberidis*, *Magnolia*, *Araliae*.

Phoma pedunculi Ellis & Everh., *Proc. Acad. Phil.*: 157 (1894). USA, Virginia, Nuttallburg, on old pedunculis of *Magnolia fraseri*.

Phoma viridarii Sacc., *Michelia* 2: 96 (1880). Gallia, Saintes, on branches of *Magnolia grandiflora*.

Phomopsis magnoliae M.M. Xiang, Z.D. Jiang & P.K. Chi, *Mycosystema* 21: 500-502 (2002). China, Guangdong Province, Guangzhou, on living leaves of *Magnolia coco*.

Phyllosticta gracilis Gucevič, *Izv. Akad. nauk. Armyan SSR biol. Sci.* 15, 12: 63 (1962). USSR, Tauria, on leaves of *Magnolia grandiflora*.

Phyllosticta kobus Henn., *Engl. Jahrb.* 37: 162 (1905). Japan, Omiya, on leaves of *Magnolia kobus.*

Phyllosticta magnoliae Cooke, *Grevillea* 9: 94 (1974). UK, Kew Botanic Garden, on leaves of *Magnolia grandiflora*.

Phyllosticta magnoliae subsp. *Cookei* Sacc., *Michelia* 1: 139 (1974). Kew, on leaves of *Magnolia grandiflora*. *Ph. Cookie* Sacc. [*Ph. Magnoliae* Cooke *Grevillea* 9: 94, vix Sacc.].

Phyllosticta magnoliae subsp. *magnoliae* Shreem., *Indian Journal of Mycology and Plant Pathology* 3: 114 (1974) [1973]. India, Rajasthan, on leaves of *Magnolia liliiflora*.

Phyllosticta magnoliae-pumilae Sawada, *Trans. nat. Hist. Soc. Formosa* 32: 290 (1942). Formosa, on *Magnolia pumila*.

Phyllosticta yugokwa Sawada, *Rep. Govt Res. Inst. Formosa* 85: 67 (1943). Formosa, on *Magnolia pumila* [in Japanese].

Phyllosticta yulan Tassi, *Bull. Lab. Ort. Bot. Siena*: 121 (1900). On leaves of *Magnolia yulan*. Senensi Botanical Garden, Germany.

Protostegia magnoliae (Ravenel) Sacc., *Ellis North Amer.* n. 676. Carolina, on wilt leaves of *Magnolia glauca*. Basionym: *Stegia magnoliae* Ravenel.

Rhabdospora magnoliae (Thüm.) Sacc., *Cryptosporium magnoliae* Thüm. *F. Austr.* n. 1069. Tetschen Bohemiae, on dead branches of *Magnolia umbellate*. Basionym: *Ascochyta magnoliae* Thüm. Basionym: *Ascochyta magnoliae* Thüm.

Septoria caerulescens Tassi, *Bull. Labor. Ort. Bot. Siena*: 232 (1899). Italy, Senensi Botanical Garden, on leaves of *Magnolia yulan*.

Septoria magnoliae Cooke, *J. Linn. Soc.*, Bot. 17: 142 (1878) [1880]. USA, Texas, Houston, on leaves of *Magnolia grandiflora*.

Septoria niphostoma Berk. & M.A. Curtis, *North Amer. Fungi* n. 447. Florida, Gainesville, Carolina, on leather leaves of *Magnolia grandiflorae*.

Sirococcus magnoliae R.X. Li, Y.Z. Shang & D.S. Wang, *Bulletin of Botanical Research Harbin* 10: 65 (1990). China, Nei Mongol Zizhiqu, on leaves of *Magnolia denutataum*.

Sphaceloma magnoliae Jenkins & J.H. Mill., *Journal of the Washington Academy of Science* 42: 323 (1952). USA, Georgia,on *Magnolia grandiflora*.

Sphaerella magnoliae Schwein., *Syn. North Amer. bor.* n. 1808. USA, Philadelphia and New Jersey, near Kaign's Point, on back of *Magnolia glauca* leaves.

Sphaeropsis dearnessii Sacc. & Trotter, *Sphaeropsis magnoliae* Ellis & Dearn. *Fungi Columb*. n. 2087 (1905), non Magnaghi (1902)—*Syll.* 18, p. 313. USA and Canada, Ontario, on branches of *Magnolia acuminata* with *Valsaria magnoliae*.

Sphaeropsis grandiflorae Ellis & Everh., *Journ. of Mycol.*: 63 (1902). USA, Alabama, on dead leaves of *Magnolia grandiflorae*.

Sphaeropsis magnoliae Ellis & Dearn., *Fungi Columb.* n. 2087 (1905). USA, Ontario, Canada, on leaves of *Magnoliae acuminata*.

Sphaeropsis magnoliae Magnaghi, *Contr. micol. Ligustica*: 8. Italy, Pegli, on living leaves of *Magnolia grandiflora*.

Sphaeropsis tephrospora Berk. & M.A. Curtis, *North Amer. Fungi* n. 409. USA, Carolina, on branches of *Magnolia*.

Sphaeropsis tulipastri House, in Dearness & House, *Bull. N.Y. St. Mus.* 197: 44 (1918). USA, on twigs of *Magnolia acuminata*.

Spogotteria magnoliae (Sacc.) Dyko & B. Sutton, in Dyko, Sutton & Roquebert, *Mycologia* 71: 926 (1979). Synonym: *Protostegia magnoliae* (Ravenel) Sacc.

Vermicularia carbonacea Berk. & M.A. Curtis, *North Amer. Fungi* n. 430. USA, Carolina, on leaves of *Magnolia grandiflora* . = *Colletotrichum* Corda (1831) [1837].

Hyphomycetes

Acrothecium obovatum var. *obovatum* Cooke & Ellis, *Grevillea* 5: 50 (1876). USA, New Jersey and Italy, Treviso, on branches of *Magnolia*.

Beltrania magnoliae M. Morelet & Vivant, in Morelet, *Cryptogamie Mycologie* 22: 30 (2001). France, on fallen decaying leaves of *Magnolia grandiflora*.

Berkleasmium talaumae Bat. & Cavalc., *Riv. Patol. Veg. Pavia* ser. 3, 4: 563 (1964). Brazil, on leaves of *Talauma ovata*.

Botrytis curta (Berk. & M.A. Curtis) Sacc., *North Amer. Fungi* n. 669 and *Saccardo's Syll. fung.* (Abellini) 4: 118 (1886). USA, Alabama, on leaves of *Magnolia*. Synnonym: *Polyactis curta* Berk. & M.A. Curtis.

Cercospora magnoliae Ellis & Harkn., *Bull. Torrey. Bot. Club.* 8: 27 (1881). USA, New Jersey, Newfield, on living leaves of *Magnolia glauca*.

Chaetopsina ludoviciana J.L. Crane & Schokn., *Canad. J. Bot.* 60: 372 (1982). USA, La, on submerged decayed ? *Magnolia* leaf.

Circinotrichum maculiforme Nees, *Syst. Pilze* (Würzburg): 19 (1817) [1816-17]. Germany, Italy, Gallia, Bohemia, America australia, on branches and leaves and rotten root of *Magnolia*.

Cladosporium magnoliae J. Lindau, *Abh. Bot. Ver. Brand.*: 74 (1905). Germany, Berlin, Tampsel, on leaves of *Magnolia soulangeana*.

Cornularia magnoliae Sousa da Câmara, *Agron. Lusit*. 9: 115 (1947). Portugal, on *Magnolia*.

Dendrodochium rubellum var. *microsporum* Sacc. *Michelia* 2: 645. New Jersey, Newfield, on bark of *Magnolia*.

Dendryphium quadriseptatum Cooke, *Grevillea* 17: 65 (1889). USA, New Jersey, on non-bark branches of *Magnolia*. Current name: *Dendryphion quadriseptatum* Cooke.

Ectostroma magnoliae Thüm., *Contr. myc. Lus.* 455. Coimbra, Botanical Garden, on living leaves of *Magnolia obovata*.

Epicoccum magnoliae var. *magnoliae* Tognini, *Seconda Contr. Micol. tosc.*: 19 (1899). Etruria, on rotten leaves of *Magnolia grandiflora*.

Epicoccum magnoliae var. *verrucosum* Bongini, *Boll. Lab. sper. Fitop. Torino*, N.S. 18: 55 (1942). Italy, on leaves of *Magnolia grandiflora* var. *ferruginea*.

Exophoma magnoliae Weedon, *Mycologia* 18: 221 (1926). USA, Florida, St. Petersburg, on leaves of *Magnolia grandiflora*.

Fusarium oxysporum f. sp. *magnoliae* Q.H. Lin & Z.X. Chen, *Acta Phytopathologica Sinica* 24: 312 (1994). Fujian, on roots of *Magnolia biloba*.

Fusicladium caruanianum Sacc., *Ann. Mycolog.* 11: 20 (1913). Casal Balzan insulae Melitae, Viridario Dm. Sacco, on leaves of *Magnolia grandiflora*.

Graphiothecium maculicolum P. Karst., *Hedwigia* (1889). Brazil, Minas Lafayette, on wilt and dead leaves of *Magnolia*?,. Current name: *Graphiothecium maculicola* P. Karst.

Haplaria chlorina Ellis & Everh., *Bull. Torrey bot. Club* 10: 97 (1883). USA, New Jersey, Newfield, on decayed wood of *Magnolia*.

Helicosporium velutinum (Ellis) Sacc., *Bull. Torr.*: 134 (1882). USA, Newfield, on dead bark of *Magnolia*. Basionym: *Helicoma velutinum* Ellis

Helminthosporium arbuscular Berk. & M.A. Curtis, *North American Fungi* n. 630, as '*Helmisporium*'], in Berkeley, *Grevillea* 3: 103 (1875).. USA, on bark of *Magnolia*. North .

Helminthosporium trichellum Sacc., *Michelia* 2*:* 147. Carolina, on bark of *Magnolia glauca*.

Hemisphaeropsis magnoliae Petr., *Sydowia*, *Ann. Mycol.*, Ser. 2, 1: 25 (1947). On *Magnolia glauca*.

Heterosporium magnoliae Weedon, *Mycologia* 18: 222 (1926). USA, Florida, St. Petersburg, on dead leaves of *Magnolia grandiflora*. Current name: *Parastenella magnoliae* (Weedon) J.C. David.

Illosporium pezizula Sacc. & Ellis, *Michelia* 2: 579. On rotting bark (of *Magnolia*?). USA, New Jersey, Newfield.

Irene werdermannii Hansf., *Sydowia* 9: 7 (1955). Chile, Chiloe Is., on leaves of *Drimys* [as *Drymis*] *winteri*.

Isariopsis magnoliae Plakidas, *Mycologia* 52*:* 258 (1961)[1960]. USA, Los .Angeles, on leaves of *Magnolia grandiflora*.

Leptographium costaricense G. Weber, Spaaij & M.J. Wingf., *Mycological Research* 100: 33 (1996). Costa Rica, isolated from rhizosphere of *Talauma sambuensis*.

Macrosporium martindalei Ellis & G. Martin, *Amer. Nat.*: 189 (1884). USA, Florida, on living leaves of *Magnolia glauca*.

Menispora ciliate Corda,. *Icon. fung.* (Prague) 1: 16 (1837). Bohemia, Italy, Gallia, UK, USA, on wood and rotting bark of *Magnolia*.

Menispora glauconigra Cooke & Ellis, *Grevillea* 7: 39 (1878). USA, New Jersey, on decaying wood of *Magnolia*.

Ovularia monilioides Ellis & G. Martin, *Am. Nat.*: 76 (1885). USA, on living leaves of *Magnolia* and *Myrica*.

Passalora magnoliae (Ellis & Harkn.) U. Braun & Crous, in Crous & Braun, *Mycosphaerella and its anamorphs*: 1. Names published in *Cercospora* and *Passalora*, *CBS Diversity Ser.* (Utrecht) 1: 263 (2003). Current name: *Phaeoisariopsis magnoliae* (Ellis & Harkn.) S.C. Jong & E.F. Morris. Basionym: *Cercospora magnoliae* Ellis & Harkn.

Penicillium repens Cooke & Ellis, *Grevillea.* USA, New Jersey, on decaying trunk of *Magnolia*..

Phaeoisariopsis magnoliae (Ellis & Harkn.) S.C. Jong & E.F. Morris, *Mycopath. Mycol. appl*. 34: 271 (1968). New Jersy, Newfield, on *Magnolia glauca* (= *M. virginiana*), Synonym: *Cercospora magnoliae* Ellis & Harkn., *Passalora magnoliae* (Ellis & Harkn.) Poonam Srivast., *Journal of Living World* 1: 117 (1994), *Cercosporidium magnoliae* (Ellis & Harkn.) Sivan., *Bitunicate Ascomycetes and their Anamorphs* (Vaduz): 220 (1984), *Passalora magnoliae* (Ellis & Harkn.) U. Braun & Crous.

Plectronidium magnoliae (Sacc.) B. Sutton & Pascoe, *Trans. Br. mycol. Soc.* 87: 253 (1986). Carolina, on wilt leaves of *Magnolia glauca*. Synnonym: *Protostegia magnoliae* (Ravenel) Sacc.

Plenocatenulis magnoliae Bat. & Cif., *Mycopathologia Mycol. appl.* 11: 65 (1959). USA, Florida, on leaves of *Magnolia glauca*.

Polyscytalum sericeum Sacc., *Michelia* 1: 86 (1877). North Italy, Gallia, Germany and USA, on leaves of *Magnolia*.

Septosporium maculatum Cooke & Ellis, *Grevillea* and *Black Moulds* (1876). USA, New Jersey, on bark of *Magnolia glauca* .

Sirodesmium ellipticum (Cooke) Sacc., *Rav. Amer. Fungi* n. 562. Australia, Carolina, on branches of *Magnolia*. *Sporidesmium ellipticum* Cooke.

Sirodesmium stictophyllum (Cooke) Sacc., *Rav. Fung. Amer.* n. 159. and in *Grevillea*. USA, Carolina, Aiken, on underneath of leaves sheet of *Magnolia*. Basionym: *Sporidesmium punctiphyllum* Cooke.

Speira minor Sacc., *Michelia* 2: 559 (1882). Silva Montello and USA, on rotting *Magnolia*. Current name: *Cryptocoryneum bigenimum* (Cooke & Ellis) S. Hughes.

Sporidesmium fusus Berk. & M.A. Curtis, *North American Fungi* n. 533. USA, on wood of *Magnolia acuminatae*.

Sporidesmium rude Ellis, *Torr. Cl.*: 107 (1876). USA, New Jersey, Newfiled, Focatis, on green leaves *Magnolia glauca*.

Sporotrichum lecanii Peck, *Rep. N.Y. St. Mus. nat. Hist.* 44: 136 (1891). USA, Salamanca, on scutellum of *Lecanii* sp. near *Magnolia acuminatum.*

Stachylidium fuscum Cooke & Ellis, *Grevillea* 8: 12 (1879). USA, New Jersey, on *Magnolia* wood.

Torulopsis magnoliae Lodder & Kreger, *The Yeasts*, Vol. 4 Yeast Organelles. Edn 2 (London): 671 (1952). Holland, on *Magnolia* flower.

Tubercularia magnoliae Pers., *sec. West*. Germany, Gallia, on bark of *Magnolia grandiflora*.

Urosporella magnoliae (Ellis & Everh.) M.E. Barr, *Mycologia* 58: 692 (1966). Basionym: *Dilophia magnoliae* Ellis & Everh.

Verticillium candelabrum Bonord., *Handb. Allgem. mykol.* (Stuttgart): 97 (1851). Germany, Italy, USA Gallia, on decaying leaves, bark and wood of *Magnolia*. Current name: *Sesquicillium candelabrum* (Bonord.) W. Gams.

Virgaria globigera Sacc. & Ellis, *Michelia* 2: 578 (1882). USA, New Jersey, Newfield, on bark of *Magnolia*.. Current name: *Virgariella globigera* (Sacc. & Ellis) S. Hughes.

Volutella conorum Ellis & Everh., *Journ. Mycol.*: 55 (1888). USA, New Jersey, Newfield, on fallen fruit of *Magnolia glauca*.

Volutellaria acaroides (Sacc.) Sacc., *Michelia* 2: 580 (1886). USA, New Jersey, Newfield, on rotting leaves of *Magnolia*.

Zygodesmus laevisporus Cooke, in Ravenel, *Grevillea* 6: 139 (1878). USA, Carolina, on bark of *Magnolia*.

Zygodesmus pannosus Berk. & M.A. Curtis, *Grevillea* 3: 112 (1875). USA, New York, Pensylvania, Carolina, Florida, on branches and decayed wood of *Magnolia*. Current name: *Tomentella radiosa* (P. Karst.) Rick.

Myxomycetes

Perichaena tessellate G. Lister, *J. Bot. Lond*. 69 (828): 298 (1931). Japan, on dead leaves of *Magnolia obovata*.

Manglietia

Ascomycetes

Asterina manglietiae B. Song & Ouyang, *Mycosystema* 20: 461 (2001). Guangdong, on leaves of *Manglietia moto*.

Hyphomycetes

Dictyosporium manglietiae Kodsueb & McKenzie, *Cryptogamie Mycologie* 27: 111-119 (2006). Thailand, Chiang Mai, Doi Suthep-Pui National Park, on dead branches of *Manglietia garrettii*.

Dokmaia monthadangii Promp., in Promputtha, Hyde, Lumyong, McKenzie and Lumyong, *Sydowia* 55: 100 (2003). Thailand, Chiang Mai, Doi Suthep-Pui National Park, on dead leaves of *Manglietia garrettii* (correct name: *Magnolia liliifera*).

Michelia

Ascomycetes

Annulohypoxylon michelianum (Ces. & De Not.) Y.M. Ju, J.D. Rogers & H.M. Hsieh, *Mycologia* 97: 859 (2005). Synonyms: *Hypoxylon albotectum* Rehm and *Hypoxylon michelianum* Ces. & De Not.

Appendiculella micheliicola J.C. Yang [as '*michelicola*'], *Acta mycological sinica* 8: 2 (1989). China, Guangdong Province, on leaves of *Michelia maudia*.

Asterina micheliae Hansf., *Proc. Linn. Soc. London* 158: 46 (1947). Ceylon, on *Michelia nilgirica*.

Asterina micheliicola B. Song, T.H. Li & Y.H. Shen, *Mycosystema* 20: 462 (2001). Guangdong, on leaves of *Michelia maudia*.

Botryosphaeria foliicola Sivan. & L.N. Nair, *Transactions of the British Mycological Society* 91: 323 (1988). India, Tamil Nadu, on leaves of *Michelia nilgarica*.

Johansonia micheliae S.K. Bose & E. Müll., *Indian Phytopath*. 18: 345 (1965). India, Himalayas, on leaves of *Michlelia kisopa*.

Leptosphaerulina kiusiana Naito, *Science. Rep. Kagoshima Univ.* 1: 73 (1952). Japan, on *Michelia chinensis*.

Meliola micheliae Hansf., *Proc. Linn. Soc. London* 158: 33 (1947). Ceylon, on *Michelia fuscata*.

Phomopsis micheliae Sankaran, Florence & J.K. Sharma, *Transactions of the British Mycological Society* 89: 404 (1987). India, Kerala, on leaves of *Michelia champaca*.

Phomopsis micheliicola Z. D. Jiang, P.K. Chi & M.M. Xiang, *Mycosystema* 21: 500-502 (2002).China, Guangdong Province, Guangzhou, on living branches of *Michelia champaca*.

Phyllachorella micheliae Syd., *Annal. Mycol.* 12: 489 (1914). India, Niligiris Madras Pres., Ootacamud, on leaves of *Michelia niligirica*. Synonym: *Vestergrenia micheliae* (Syd.) Arx & E. Müll.

Scolecopeltis salacensis Racib., *Parasit. Algen und Pilze Javas* 3: 35 (1900). Java, Salak ins., on leaves of *Michelia velutina*.

Sphaeria micheliana Kunze, *Mykologische Hefte* (Leipzig) 2: 37 (1823). On dry branches of *Quercus*.

Vestergrenia micheliae (Syd.) Arx & E. Müller, *Beitr. Kryptogamenfl. Schweiz* 11: 75 (1954). Basionym: *Phyllachorella micheliae* Syd.

Basidiomycetes

Collybia micheliana Fr., *Obs.* 2: 146 (1818). Europe, on dead root of grass.

Corticium michelianum (Caldesi) Fr., *Hymenomyc. eur.* (Upsaliae): 660 (1874). Italy, on *Lauri* and *Quercus*. Basionym: *Hypochnus michelianus* Caldesi.

Goplana micheliae Racib. *Parasit. Alg. Pilze Java's* (Jakarta) 2: 25 (1900). Java, on leaves of *Michelia velutina*.

Coelomycetes

Asterostomella micheliae Hosag. & Goos, *Mycotaxon* 59: 162 (1996). India, Tamil Nadu, on leaves of *Michelia nilagirica*.

Botryodiplodia micheliae (Henn.) Petr. & Syd., *Annal. Mycol.* 23: 276 (1925). Basionym: *Spaheropsis micheliae* (Henn.).

Diplodia micheliae Henn., *Verh. bot. Ver. Prov. Brandenb.* 40: 167 (1898). Germany, Berol. Botanical Garden, on leaves of *Michelia fuscata*, associated with *Sphaeropsis micheliae*.

Hendersonia micheliae Gucevič, *Nov. Sist. niz. Rast.* 6: 202 (1970). SSR, Ukraine, on leaves of *Michelia yunnanensis*.

Pestalotia micheliae Kalani, *Mycopathologia* 19: 45 (1963). India, Poona, on leaves of *Michelia champaca*.

Phyllosticta micheliicola V.G. Rao, *Mycopathologia* 20: 65 (1963). India, Poona, on leaves of *Michelia champaca*.

Sphaeropsis micheliae Henn., *Verh. Bot. Ver. Prov. Brandbg.* 40: 166 (1898). Germany, Berol. Botanical Garden, on leaves of *Michelia fuscata*.

Hyphomycetes

Asterostomella micheliae Hosag. & Goos, *Mycotaxon* 59: 162 (1996). Tamil Nadu, on leaves of *Michelia nilagirica*.

Cercospora micheliae Boedijn, *Nova Hedwigia* 3: 424 (1961, 1962). Java, on leaves of *Michelia champaca* and *Michelia* sp.

Exosporium indicum Tilak, *Mycopath. Mycol. appl.* 30: 353 (1966). India, Madras Province, on dead twigs of *Michelia nilgirica*.

Pseudocercospora micheliicola J.M. Yen, A.K. Kar. & B.K. Das, *Mycotaxon* 16: 62 (1982). India, West Bengal, on leaves of *Michelia champaca*.

Pseudocercospora micheliae (Boedijn) U. Braun, *Mycotaxon* 78:327–343 (2001). Indonesia, Borneo, Java, Sumatra, on *Michelia champaka*.

Cercoseptoria micheliae B.V. Patil & Thirum., *Sydowia* 20: 34 (1968) [1966]. India, Maharashtra, on leaves of *Michelia champaca*.

Myxomycetes

Robillarda poonensis Kalani, *Mycopathologia* 19: 44 (1963). India, Poona, on leaves of *Michelia champaca*.

Schizandra

Ascomycetes

Microsphaera penicillata f. *schizandrae* Jacz., *Taschenbestimmb. f. Pilze* 2, *Erysiphaceen*: 357 (1926). Russia, on leaves of *Schizandra chinensis*.

Microsphaera schizandrae f. *breviseta* Tanda & Y. Nomura, *Trans. Mycol. Soc. Japan* 33: 219 (1992). Japan, on leaves of *Schisandra chinensis*.

Microsphaera schizandrae Sawada, *Bull. Govt Forest Exp. Sta., Tokyo* 50: 123 (1951). Japan, on *Schizandra nigra*.

Mycosphaerella schizandrae Mitrosh, *Not. Syst. Crypt. Inst. Bot. Acad. Sci. URSS* 6: 82 (1949). USSR, on *Schizandra chinensis*.

Basidiomycetes

Endophyllum maheshwarii Hard. Singh & Jalan, *Indian Phytopath.* 18: 32 (1965). India, Himalayas, on leaves of *Schizandra grandiflora*.

Mycena subulifera Singer, *Beih. Nova Hedwigia* 29: 136 (1969). Chile, on wood of *Drimys*.

Coelomycetes

Ascochyta procenkoi Melnik, *Nov. Sist. niz. Rast.*: 272 (1967). On *Schizandra chinensis*.

Ascochyta zonata Ablakatova & Koval [as 'A. Proc.'], *Bot. Mater.* (*Not. syst. Sect. crypt. Inst. bot. Acad. Sci. USSR*) 14: 155 (1961). USSR, Maritime Territory, on leaves of *Schizandra chinensis*.

Cytospora schizandrae Ablakatova & Koval, *Bot. Mater.* (*Not. syst. Sect. crypt. Inst. bot. Acad. Sci. USSR*) 14: 157 (1961). USSR, Maritime Territory, on dead branches of *Schizandra chinensis*.

Phoma schizandrae Ablakatova & Koval, *Bot. Mater.* (*Not. syst. Sect. crypt. Inst. bot. Acad. Sci. USSR*) 14: 154 (1961). USSR, Maritime Territory, on dead branches of *Schizandra chinensis*.

Phyllosticta schizandrae Mitrosh., *Not. Syst. Crypt. Inst. Bot. Acad. Sci. USSR* 6: 83 (1949). USSR, on *Schizandra chinensis*.

Rhabdospora schizandrae Mitrosh., *Not. Syst. Crypt. Inst. Bot. Acad. Sci. USSR* 6: 84 (1949). USSR, on *Schizandra chinensis*.

Hyphomycetes

Ramularia schizandrae Ablakatova & Koval [as 'A. Proc.'], *Bot. Mater.* (*Not. syst. Sect. crypt. Inst. bot. Acad. Sci. USSR*) 14: 153 (1961). USSR, Maritime Territory, on leaves of *Schizandra chinensis*.

Stenella schizandrae Pavgi & U.P. Singh, *Sydowia* 24: 117 (1971) [1970]. India, Darjeeling, on leaves of *Schizandra grandiflora*.

Kadsura

Ascomycetes

Meliola kadsurae Yamamoto, *Trans. nat. Hist. Soc. Formosa* 31: 55 (1941). Japan, Formosa, on *Kadsura japonica*.

Hyphomycetes

Cercospora kadsurae Togashi & Katsuki, *Bot. Mag., Tokyo* 65: 22 (1952). Japan, on *Kadsura japonica*.

Pseudocercospora kadsurae (Togashi & Katsuki) Y.L. Guo & X.J. Liu, *Mycosystema* 5: 104 (1992). Japan, on *Kadsura japonica*. Basionym: *Cercospora kadsurae* Togashi & Katsuki.

Septoria kadsurae Tassi, *Bull. Labor. Ort. Siena*: 232 (1899). Italy, Senensi Botanical Graden, on leaves of *Kadsura japonica*.

Stictopatella drymidis Batista & Barreto, *Saccardoa* 1: 73 (1960). Chile, on leaves of *Drymis* [*Drimys*] *chilensis*.