

## Discomycetous Fungi of the *Leotiales* found on the *Betulaceae* in Bulgaria

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**Abstract:** A checklist is given of 34 discomycetous fungi of the *Leotiales* growing on substrates of the *Betulaceae* in Bulgaria. The fungi were distributed between the host-genera as follows: 14 species on *Alnus* Mill., 10 on *Betula* L., 11 on *Carpinus* L. and 15 on *Corylus* L.

**Key Words:** Leotiales, alder, birch, hornbeam, hazel, Bulgaria

### Introduction

The wood, leaves and other parts of deciduous trees are favourable substrates for the development of a rich and diverse mycoflora of parasitic and saprotrophic fungi. This article attempts to list in full the discomycetous fungi from *Leotiales* which have been so far identified in Bulgaria on substrates from four genera of the *Betulaceae*: *Alnus* Mill. (alder), *Betula* L. (birch), *Carpinus* L. (hornbeam) and *Corylus* L. (hazel).

Analysis of available literature has shown that there are few publications devoted to this subject. Groves & Elliott (1961) proposed a key for 11 discomycetous species of the *Sclerotiniaceae* found on the flowers and fruits of *Alnus*. Kutorga (1989) reported 47 discomycetous fungi found on the various parts of alder too. Schumacher (1978) recorded six amenticolous *Ciboria* species from Norway. The same author later described five species of *Sclerotiniaceae* identified on the leaves of birch and alder (Schumacher, 1990).

In Bulgaria, Fakirova (1993, 1997a, 1997b) has published data on the species composition of pyrenomycetous fungi identified on three of the studied hosts: alder, birch and hornbeam.

### Materials

Most of the data in this paper are based on revised herbarium material of discomycetous fungi stored in the

Mycological Collection of the Institute of Botany (SOMF) and on samples from the same group of fungi collected by the author in the 1990-1996 period. Some species in the list are from literature data alone, owing to lack of herbarium material, and the sources are quoted. The works of Baral & Krieglsteiner (1985), Dennis (1978), Lizon (1992), and Raitviir (1970) were used for identification of the fungal taxa and for updating their nomenclature. The distribution of species is given by floral regions in Bulgaria (Figure 1) as determined by Kozhuharov (1992).

### Results and Discussion

This study has identified 34 species of leotialean discomycetes occurring in Bulgaria on the *Betulaceae*. The four host genera are represented by seven species: *Alnus glutinosa* (L.) Gaertn., *A. incana* (L.) Moench., *A. viridis* (Chaix) DC., *Betula pendula* Roth, *Carpinus betulus* L., *C. orientalis* Mill., and *Corylus avellana* L.

The identified fungi belong to five families of the *Leotiales* (Table 1). The *Leotiaceae* is represented by the highest number of species (13) and the *Orbiliaceae* the lowest (two species). The *Dermateaceae* is represented by seven species. The remaining two families - *Hyaloscyphaceae* and *Sclerotiniaceae* - are each represented by six species.

F u n g i	S u b s t r a t e s				
	wood	catkins	cones	nuts	leaves
<b>Dermateaceae</b>					
*** <i>Mollisia amenticola</i>			<i>Alnus</i>		
- <i>Mollisia cinerea</i>	<i>Betula</i>				
	<i>Carpinus</i>				
	<i>Corylus</i>				
- <i>Mollisia discolor</i>	<i>Corylus</i>				
- <i>M. ligni</i>	<i>Betula</i>				
* <i>Pyrenopeziza benesuada</i>	<i>Alnus</i>				
- <i>Tapesia fusca</i>	<i>Alnus</i>				
	<i>Betula</i>				
	<i>Carpinus</i>				
	<i>Corylus</i>				
- <i>Tapesia lividofusca</i>	<i>Alnus</i>				
	<i>Betula</i>				
	<i>Carpinus</i>				
	<i>Corylus</i>				
<b>Hyaloscyphaceae</b>					
* <i>Brunnipila calyculiformis</i>	<i>Corylus</i>				
- <i>Dasyscyphella nivea</i>	<i>Carpinus</i>	<i>Alnus</i>			
	<i>Corylus</i>				
- <i>Dasyscyphus cerinus</i>	<i>Corylus</i>				
- <i>Lachnum brevipilosum</i>	<i>Betula</i>				
- <i>Lachnum pudibundum</i>	<i>Corylus</i>				
- <i>Lachnum virgineum</i>	<i>Betula</i>	<i>Betula</i>	<i>Alnus</i>		
	<i>Carpinus</i>				
	<i>Corylus</i>				
<b>Leotiaceae</b>					
- <i>Bisporella citrina</i>	<i>Alnus</i>				
- <i>Bisporella subpallida</i>	<i>Carpinus</i>			<i>Corylus</i>	
* <i>Calycellina leucella</i>					<i>Betula</i>
- <i>Cenangium populneum</i>	<i>Betula</i>				
** <i>Encoelia glaberrima</i>	<i>Corylus</i>				
- <i>Hymenoscyphus calyculus</i>	<i>Alnus</i>				
	<i>Carpinus</i>				
	<i>Corylus</i>				
- <i>Hymenoscyphus fructigenus</i>				<i>Corylus</i>	
- <i>Hymenoscyphus imberbis</i>	<i>Corylus</i>				
- <i>Hymenoscyphus phyllogenus</i>					<i>Betula</i>
- <i>Hymenoscyphus serotinus</i>	<i>Carpinus</i>				
** <i>Pezizella alniella</i>			<i>Alnus</i>		
** <i>Pezizella parilis</i>	<i>Betula</i>				
** <i>Tympanis alnea</i>	<i>Alnus</i>				
<b>Orbiliaceae</b>					
- <i>Orbilia chrysocoma</i>	<i>Carpinus</i>				
- <i>Orbilia luteorubella</i>	<i>Carpinus</i>				
<b>Sclerotiniaceae</b>					
* <i>Ciboria amentacea</i>		<i>Alnus</i>			
** <i>Ciboria coryli</i>		<i>Corylus</i>			
** <i>Ciboria viridifusca</i>			<i>Alnus</i>		
* <i>Poculum firmum</i>	<i>Alnus</i>				
** <i>Rutstroemia bolaris</i>	<i>Carpinus</i>				
** <i>Rutstroemia conformata</i>					<i>Alnus</i>

Table 1. Discomycetous fungi from *Leotiales* found in Bulgaria on alder, birch, hornbeam and hazel substrates

Substrate specificity  
 \*\*\* - species- or genus-specific  
 \*\* - confined to *Betulaceae*  
 \* - mainly on *Betulaceae*, but occasionally found on hosts from other families  
 - - on hosts from a range of families

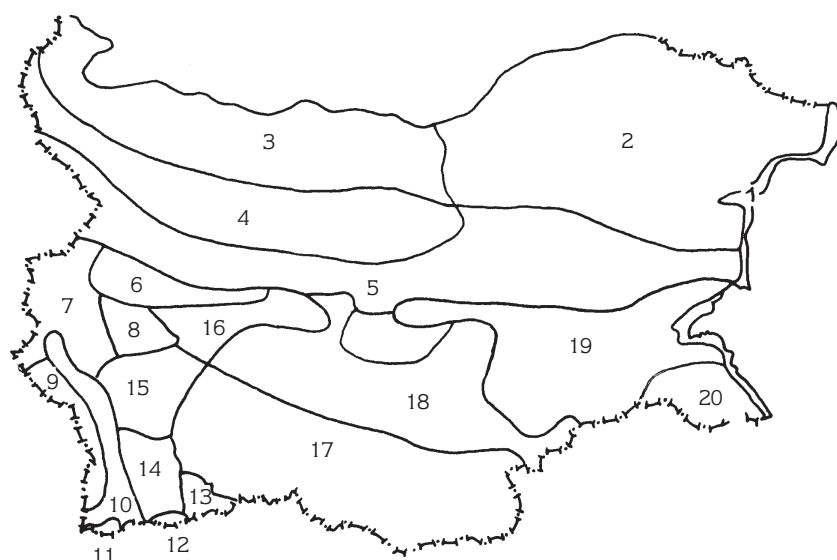


Figure 1. Floral regions of Bulgaria.  
 1- Black Sea Coast  
 2- Northeast Bulgaria  
 3- Danubian Plain  
 4- Forebalkan  
 5- Balkan Range (Stara Planina Mts)  
 6- Sofia region  
 7- Znepole region  
 8- Vitosha region  
 9- West Frontier Mts  
 10- River Strouma  
 11- Mt Belasitsa  
 12- Mt Slavyanka  
 13- River Mesta  
 14- Pirin Mts  
 15- Rila Mts  
 16- Sredna Gora Mts  
 17- Rhodopi Mts (Rhodopes)  
 18- Thracian Lowland  
 19- Toundzha Hilly Country  
 20- Mt Strandzha

Most of the established fungi are saprotrophs fruiting on various parts of the host. Only three, the *Ciboria* species, are weak pathogens, infecting catkins of alder and hazel (Table 1). The largest number of species was identified on hazel (15 species) and alder (14 species), with 11 species being found on hornbeam and 10 on birch.

The majority of the fungi inhabit rotten wood (mainly rotten branches), with 12 species on hazel, 11 on hornbeam, eight on birch and seven on alder (Table 1). A comparatively high number of five species was found on alder cones, and two species were found on hazelnuts. There were single species identified on the male catkins of alder, birch and hazel. Two species were detected on birch leaves, and one on the rotten leaves of alder, but no species were found on the leaves of hazel or hornbeam. Similarly, no species were found on the catkins of hornbeam.

Many saprotrophic and weakly pathogenic fungi, including those of the *Leotiales*, are genus- or species-specific. Furthermore, they may be restricted to a single part of the host, i.e. they are extremely narrowly specialized with respect to their substrate. Such species encountered during our study are *Ciboria viridifusca*, *Mollisia amenticola* and *Pezizellaalniella* on alder cones, and *Rutstroemia conformata* on alder leaves. Similarly, *Ciboria coryli* is a specialized colonizer of hazel catkins and *Encoelia glaberrima* on hazel wood, while *Rutstroemia bolaris* is confined to hornbeam wood. Less

strictly specialized are *Ciboria amentacea* on alder catkins, but reported in the literature elsewhere also from hazel and *Salix* catkins, *Tympanis alnea* on alder twigs and elsewhere on birch twigs, and *Calycellina leucella* on birch leaves and elsewhere on alder leaves. These observations coincide with the reports of Baral & Krieglsteiner (1985) and Dennis (1978).

A high number of saprotrophic fungi are, however, more catholic, and grow on a wider range of host-plants from various families. Examples identified in Bulgaria on *Betulaceae* are *Bisporella subpallida*, *Dasyscyphella nivea*, *Hymenoscyphus calyculus*, *Lachnum virgineum*, *Mollisia cinerea*, *Tapesia fusca* and *T. lividofusca* (Table 1).

#### Discomycetous fungi found on alder (*Alnus* Mill.)

##### *Bisporella citrina* (Batsch) Korf & S.E.Carp.

On fallen twig of *A. glutinosa*: Sredna Gora Mts (Mt Lozenska), SOMF 8351.

##### *Ciboria amentacea* (Balb.) Fuckel

On fallen catkins of *A. glutinosa*: Vitosha region (Mt Plana), SOMF 5244; Mt Vitosha, SOMF 5308, 6372, 6705, 6936; Sredna Gora Mts (Mt Lozenska) - Hinkova & Alexandrov (1971).

##### *C. viridifusca* (Fuckel) Höhnelt

On fallen cones of *A. glutinosa*: Pirin Mts, SOMF 14393.

**Dasyscyphella nivea** (Fr.) Raitv.

On fallen cones of *A. glutinosa*: Vitosha region (Mt Vitosha), SOMF 8358 (as *Dasyscyphus niveus* (Hedw.) Sacc.).

**Hymenoscyphus calyculus** (Sowerby) W. Phillips

On dead branches of *A. glutinosa*: Vitosha region (Mt Plana), SOMF 6050, 6588, 6589.

On dead branches of *A. viridis*: Vitosha region (Mt Vitosha), SOMF 8445.

All specimens were deposited as *Helotium calyculus* (Sowerby) Fr.

**Lachnum virgineum** (Batsch: Fr.) P. Karst.

On fallen cones of *A. glutinosa*: Black Sea Coast - Kuthan & Kotlaba (1981); Vitosha region (Mt Plana), SOMF 5247.

On fallen cones of *A. viridis*: Vitosha region (Mt Vitosha), SOMF 8357, 8442.

On fallen cones of *Alnus* sp., Pirin Mts, SOMF 16211.

All specimens were deposited as *Dasyscyphus virgineus* (Batsch) Gray.

**Mollisia amenticola** (Sacc.) Rehm

On fallen cones of *A. glutinosa*: Vitosha region (Mt Plana), SOMF 5281, 5351, 6043.

**Pezizellaalniella** (Nyl.) Dennis

On fallen cones of *A. glutinosa*: Vitosha region (Mt Vitosha), SOMF 6700, 20796, 21001; Mt Plana, SOMF 6590, 6591; Pirin Mts, SOMF 14393; Sredna Gora (Mt Lozenska), SOMF 6677; Thracian Lowland, SOMF 6397.

**Poculum firmum** (Pers.) Dumont

On fallen twigs of *A. glutinosa* - Alexandrov (1969), as *Rustroemia firma* (Pers.) P. Karst.

**Pyrenopeziza benesuada** (Tul.) Gremmen

On dead twigs of *A. glutinosa*: Vitosha region (Mt Plana), SOMF 5298, 6593 (as *Mollisia benesuada* (Tul.) W. Phillips); Mt Vitosha, SOMF 20801.

On dead twigs of *A. incana*: Rila Mts, SOMF 21508.

**Rutstroemia conformata** (P. Karst.) Nannf.

On fallen leaves of *A. glutinosa*: Vitosha region (Mt Vitosha), SOMF 6897.

**Tapesia fusca** (Pers.) Fuckel

On dead twigs of *A. glutinosa*: Vitosha region (Mt Plana), SOMF 6046; Rila Mts, SOMF 21509.

**T. lividofusca** (Fr.) Rehm

On rotten bark of *A. glutinosa*: Vitosha region (Mt Plana), SOMF 6047.

**Tympanis alnea** (Pers.) Fr.

On dead twigs of *A. glutinosa*: Stara Planina Mts - Nannizzi (1938).

**Discomycetous fungi found on birch (*Betula pendula* Roth)**

**Calycellina leucella** (P. Karst.) Dennis

On dry leaves: Vitosha region (Mt Vitosha), SOMF 6578 (as *Helotium leucellum* (P. Karst.) P. Karst.).

**Cenangium populneum** (Pers.) Rehm

On rotten branches: Vitosha region (Mt Vitosha) - Barsakov (1933).

**Hymenoscyphus phyllogenus** (Rehm) O. Kuntze

On fallen leaves: Vitosha region (Mt Plana), SOMF 6580 (as *Helotium phyllogenum* Rehm).

**Lachnum brevopilosum** Baral & Krieglst.

On rotten wood: Vitosha region (Mt Vitosha), SOMF 8398, 8399 (as *Dasyscyphus brevopilus* Le Gal).

**L. virgineum** (Batsch: Fr.) P. Karst.

On rotten twigs: Vitosha region (Mt Vitosha), SOMF 6939 (as *Dasyscyphus virgineus*).

On catkins: Vitosha region (Mt Vitosha), SOMF 8396 (as *Dasyscyphus virgineus*).

**Mollisia cinerea** (Batsch ex Mèrat) P. Karst.

On fallen twig: Vitosha region (Mt Vitosha), SOMF 21181.

**M. ligni** (Desm.) P. Karst.

On decorticated branch: Vitosha region (Mt Vitosha), SOMF 21179.

**Pezizella parilis** (P. Karst.) Dennis

On rotten branches: Vitosha region (Mt Plana), SOMF 6586.

**Tapesia fusca** (Pers.) Fuckel

On dead wood: Vitosha region (Mt Vitosha), SOMF 8402.

**T. lividofusca** (Fr.) Rehm

On dead wood: Vitosha region (Mt Vitosha), SOMF 5292 (as *Tapesia melaleucoides* Rehm).

**Discomycetous fungi found on hornbeam (*Carpinus* L.)**

***Bisporella subpallida* (Rehm) Dennis**

On decorticated branches of *C. betulus*: Vitosha region (Mt Vitosha), SOMF 5383 (as *Calycella subpallida* (Rehm) Dennis).

***Dasyscyphella nivea* (Fr.) Raitv.**

On dead branches of *C. betulus*: Vitosha region (Mt Vitosha), SOMF 5381, 5382 (as *Dasyscyphus niveus*).

***Hymenoscyphus calyculus* (Sowerby) W.Phillips**

On dead branches of *C. betulus*: Vitosha region (Mt Vitosha), SOMF 8400 (as *Helotium calyculus*).

***H. serotinus* (Pers.: Fr.) W.Phillips**

On rotten twigs of *Carpinus* sp.: Sredna Gora Mts (Mt Lozenska), SOMF 13490 (as *Helotium serotinum* (Pers.) Fr.).

***Lachnum virgineum* (Batsch: Fr.) P.Karst.**

On decorticated twig of *C. orientalis*: Mt Belasitsa, SOMF 21482 (as *Dasyscyphus virgineus*).

***Mollisia cinerea* (Batsch ex Mèrat) P.Karst.**

On rotten twigs of *C. betulus*: Vitosha region (Mt Vitosha), SOMF 6334.

***Orbilina chrysocoma* (Bull.) Sacc.**

On dead wood of *C. betulus*: Northeast Bulgaria - Hinkova (1962).

***O. luteorubella* (Nyl.) P.Karst.**

On rotten branch of *Carpinus* sp.: Black Sea Coast - Kuthan & Kotlaba (1981).

***Rutstroemia bolaris* (Batsch: Fr.) Rehm**

On rotten branches of *C. betulus*: Vitosha region (Mt Vitosha), SOMF 6370, 8370.

On rotten branches of *C. orientalis*: Rhodopi Mts, SOMF 6384.

On branches of *Carpinus* sp.: Vitosha region (Mt Vitosha), SOMF 4394; Sredna Gora Mts (Mt Lozenska), SOMF 20812.

***Tapesia fusca* (Pers.) Fuckel**

On dead branches of *C. betulus*: Vitosha region (Mt Vitosha), SOMF 6961.

***T. lividofusca* (Fr.) Rehm**

On dead branches of *C. betulus*: Znepole region, SOMF 20784; Vitosha region (Mt Vitosha), SOMF 5263, 6335.

**Discomycetous fungi, found on hazel (*Corylus avellana* L.)**

***Bisporella subpallida* (Rehm) Dennis**

On hazelnut shell: Vitosha region (Mt Vitosha), SOMF 21516.

***Brunnipila calyculiformis* (T.Schumach.: Fr.) Baral & Krieglst.**

On rotten branches: Vitosha region (Mt Vitosha), SOMF 7100, 8359, 14399; Sredna Gora Mts (Mt Lozenska), SOMF 6914.

All specimens were deposited as *Dasyscyphus calyculiformis* (Schum.) Rehm.

***Ciboria coryli* (Schell.) Buchw.(= *Sclerotinia coryli* Schell.)**

On fallen catkins: Vitosha region (Mt Vitosha), SOMF 5352, 6942, 8391; Sredna Gora Mts (Mt Lozenska), SOMF 6675.

All specimens were deposited as *Sclerotinia coryli* Schell.

***Dasyscyphella nivea* (Fr.) Raitv.**

On rotten wood: Vitosha region (Mt Vitosha), SOMF 8362 (as *Dasyscyphus niveus*).

***Dasyscyphus cerinus* (Pers.: Fr.) Fuckel**

On rotten branches: Vitosha region (Mt Vitosha), SOMF 6946; Sredna Gora Mts (Mt Lozenska), SOMF 5289.

***Encoelia glaberrima* (Rehm) Kirschst.**

On rotten twigs: Black Sea Coast - Kuthan & Kotlaba (1988).

***Hymenoscyphus calyculus* (Sowerby) W.Phillips**

On dead branches: Vitosha region (Mt Vitosha), SOMF 7094 (as *Helotium calyculus*).

***H. fructigenus* (Bull.) Gray**

On fallen hazelnuts and their shell: Vitosha region (Mt Vitosha), SOMF 8346, 8392, 8393, 22051; Sredna Gora Mts (Mt Lozenska), SOMF 6903, 8380, 8405.

All specimens, except SOMF 22051, were deposited as *Helotium fructigenum* (Bull.) Fuckel.

**H. imberbis** (Bull.) Dennis

On rotten branches: West Frontier Mts, SOMF 22067.

**Lachnum pudibundum** (Quèl.) J.Schröt.

On rotten branches: Sredna Gora Mts (Mt Lozenska), SOMF 7066, 13580 (as *Dasyscyphus pudibundum* (Quèl.) Sacc.).

**L. virgineum** (Batsch: Fr.) P.Karst.

On rotten branches: Sredna Gora Mts (Mt Lozenska), SOMF 6643 (as *Dasyscyphus virgineus*).

**Mollisia cinerea** (Batsch) P.Karst.

On rotten wood: Vitosha region (Mt Vitosha), SOMF 20802; Sredna Gora Mts (Mt Lozenska), SOMF 7054.

**M. discolor** (Mont.) W.Phillips

On bark: Vitosha region (Mt Vitosha), SOMF 20756.

**Tapesia fusca** (Pers.) Fuckel

On dead branches: Vitosha region (Mt Vitosha), SOMF 21315; Sredna Gora Mts (Mt Lozenska), SOMF 6913.

**T. lividofusca** (Fr.) Rehm

On dead branches: Vitosha region (Mt Vitosha), SOMF 6393, 6883, 7105.

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