

MB120T61 Field course in Botany LS 2017/2018

Fungi, lichens and fungal-like organisms

Overview of basic species and genera most frequently shown during field excursions and their taxonomic placement in current phylogenetic system. In short, the morphological features observed in the field and ecology are mentioned at each order. **Species marked with an asterisk are depicted in right.**

Fungi

Ascomycota

subdiv. Taphrinomycotina

Class Taphrinomycetes

- **no fruiting bodies**, biotrophic, organotrophic plant parasites

Protomyces macrosporus

Taphrina deformans

Taphrina tosquinetii

Taphrina betulina

Taphrina pruni

subdiv. Pezizomycotina

Class Pezizomycetes

Order Pezizales

- **apothecium**, saprotrofní nebo mykorhizní, na opadu a půdě

*Aleuria aurantia**

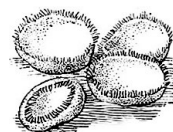
Choiromyces meandriformis

Mitrula paludosa



Peziza sp.

*Scutellinia crinita**



Class Eurotiomycetes

Order Eurotiales

- **kleistothecium** nebo **podzemní hlízovité plodnice**, saprotrofní, ektomykorhizní

Elaphomyces muricatus

Elaphomyces granulatus

Class Leotiomycetes

Order Erysiphales (powdery mildew)

- **chasmothecium**, biotrophic plant parasites on vascular plants

Blumeria graminis

Erysiphe polygoni

Erysiphe (= *Microsphaera*) *alphitoides**

Golovinomyces (= *Erysiphe*) *cichoracearum*

Microsphaera grossulariae

Podosphaera leucotricha

Podosphaera macularis

Podosphaera pannosa

Podosphaera (= *Sphaerotheca*) *mors-uvae*

Host

grasses

Polygonum sp.

Quercus spp.

Asteraceae

Grossularia uva-crispae

Malus domestica

Humulus lupulus

Rosa sp.

Grossularia uva-crispae



Order Helotiales

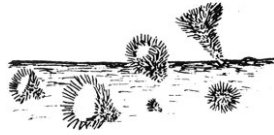
- **apothecium**, necrotrophic plant parasites, saprotrophic on the litter

Bisporella citrina

Hymenoscyphus fraxineus

Lachnellula willkommii

*Lachnum virgineum**

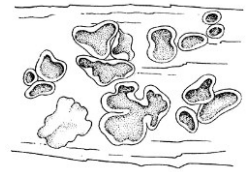


*Mollisia cinerea**

Pseudopeziza trifolii

Pyrenopeziza rubi

Tapesia fusca



Order Rhytismatales

- **hysterothecium**, necrotrophic plant parasites, saprotrophic on the litter

Colpoma quercinum

*Lophodermium pinastri**



Rhytisma acerinum

Class Sordariomycetes

Order Xylariales

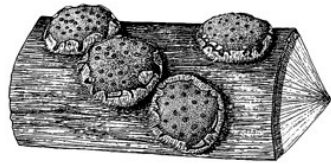
- **perithecium** immersed in hard **stroma**, saprotrophic on wood

*Diatrype disciformis**

Diatrype stigma

Diatrypella quercina

Eutypa sp.



Hypoxydon sp.

Kretschmaria (=Ustulina) deusta

*Xylaria hypoxylon**

Xylaria polymorpha



Order Hypocreales

- **perithecium** free or in **stroma**, plant parasites, saprotrophic on the litter

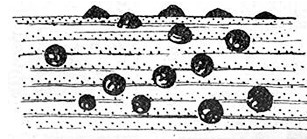
Claviceps purpurea

Epichl e typhina

Trichoderma sp.

*Leptosphaeria doliolum**

Nectria cinnabarina



Order Coronophorales

- **perithecium** free, saprotrophic on the

*Bertia moriformis**



litter

Class Dothideomycetes

- **pseudothecium**, necrotrophic plant parasites, saprotrophic on the litter

Venturia inaequalis

Venturia pirina

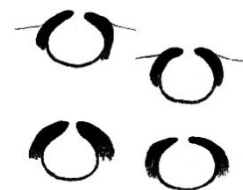
Lichenized fungi (lichens)

(contin. Ascomycota): Class Dothideomycetes

Order Verrucariales:

- fruiting bodies **perithecium**, frequently endolithic, crustose thallus

*Verrucaria muralis**



Class Lecanoromycetes

Order Acarosporales

- fruiting bodies **apothecium**, polysporic asci, on rocks, crustose thallus

Acarospora fuscata

Order Baeomycetales

- fruiting bodies **apothecium**, frequently stalked, crustose thallus

*Baeomyces rufus**



Order Ostropales

- fruiting bodies **apothecium**, frequently modified, crustose thallus

Diploschistes scruposus

*Graphis scripta**



Order Pertusariales

- fruiting bodies **apothecium**, crustose thallus

Pertusaria amara

Order Lecanorales

- fruiting bodies **apothecium**, all types of thallus

*Cetraria islandica**

Cladonia arbuscula

Cladonia coniocraea

Cladonia digitata

*Cladonia fimbriata**

Cladonia furcata

Cladonia macilenta

Cladonia pyxidata

Cladonia rangiferina

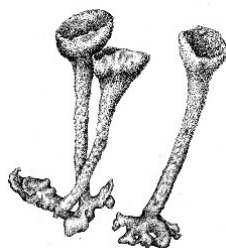
Parmelina tiliacea

Platismatia glauca

Pseudevernia furfuracea

Psilolechia lucida

Evernia prunastri



*Hypogymnia physodes**

Hypogymnia tubulosa

Lecanora saxicola

Lecidea fuscoatra

Lepraria sp.

Melanelixia glabratula

Melanohalea exasperatula

Parmelia saxatilis

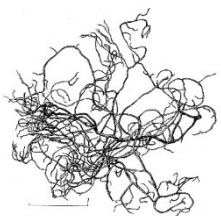
Parmelia sulcata

Ramalina pollinaria

Usnea sp.*

Xanthoparmelia conspersa

Xanthoparmelia stenophylla

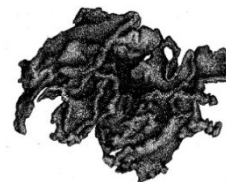


Order Peltigerales

- mostly with cyanobacterium as the photobiont

Collema sp.*

Peltigera praetextata



Order Teloschistales

- fruiting bodies **apothecium**, mostly with an algae as an photobiont, frequently K⁺ red (antraquinons), polarioloculuous spores*, crustose to foliose thallus

Caloplaca decipiens

Caloplaca sp.

Hypocenomyce scalaris

Phaeophyscia orbicularis

Physcia adscendens



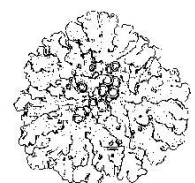
Physcia caesia

Physcia tenella

Rhizocarpon geographicum

*Xanthoria parietina**

Xanthoria polycarpa



Order Candelariales

Candelariella vitellina

Order Umbilicariales

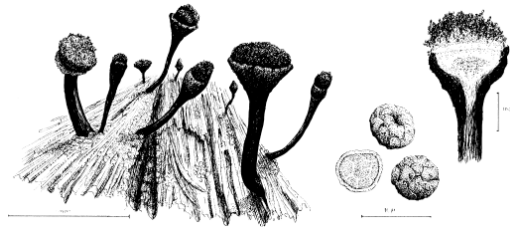
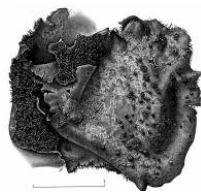
*Lasallia pustulata**

Umbilicaria sp.

unclear placement:

Leprocaulon microscopicum

*Chaenotheca ferruginea**



Basidiomycota

Pucciniomycotina

Class Microbotryomycetes

Order Microbotryales

- **spores**, biotrophic, organotrophic plant parasites

Microbotryum violaceum - on Caryophyllaceae

subdiv. Ustilaginomycotina

Class Exobasidiomycetes

Order Exobasidiales

- **no fruiting bodies**, biotrophic, organotrophic plant parasites

Exobasidium vaccinii - on *Vaccinium vitis-idaea*

Class Ustilaginomycetes

Order Ustilaginales (sněti)

- **spores**, biotrophic, organotrophic plant parasites

Ustilago filiformis - na *Glyceria*

Ustilago striiformis - na planých travách, hlavně *Elytrigia*

Class Pucciniomycetes

Order Pucciniales

- **ložiska spor** (life cycle on the last page), biotrophic plant parasites

	Spermogonia 0	Aecia I	Uredia II	Telia III
<i>Coleosporium campanulae</i>	(<i>Pinus</i>)	(<i>Pinus</i>)	<i>Campanula</i>	<i>Campanula</i>
<i>Gymnosporangium amelanchieris</i>	<i>Sorbus</i>	<i>Sorbus</i>		(<i>Juniperus communis</i>)
<i>Melampsora caprearum</i>	(<i>Larix</i>)	(<i>Larix</i>)	<i>Salix</i>	<i>Salix</i>
<i>Phragmidium mucronatum</i>	<i>Rosa</i>	<i>Rosa</i>	<i>Rosa</i>	<i>Rosa</i>
<i>Puccinia aegopodii</i>				<i>Aegopodium</i>
<i>Puccinia coronata</i>	<i>Frangula, Rhamnus</i>	<i>Frangula, Rhamnus</i>	<i>Lolium, Holcus, aj.</i>	<i>Lolium, Holcus, aj.</i>
<i>Puccinia dioicae</i>	<i>Taraxacum, Senecio</i>	<i>Taraxacum, Senecio</i>	<i>Carex</i>	<i>Carex</i>
<i>Puccinia malvacearum</i>				<i>Malva</i>
<i>Puccinia perplexans</i>	<i>Ranunculus acer</i>	<i>Ranunculus acer</i>	<i>Alopecurus pratensis</i>	<i>Alopecurus pratensis</i>
<i>Puccinia poarum</i>	<i>Tussilago</i>	<i>Tussilago</i>	<i>Poa</i>	<i>Poa</i>
<i>Puccinia poae-nemoralis</i>	unknown	unknown	<i>Poa nemoralis</i>	(<i>Poa nemoralis</i>)
<i>Puccinia punctiformis</i>	<i>Cirsium arvense</i>		<i>Cirsium arvense</i>	<i>Cirsium arvense</i>
<i>Puccinia sessilis</i>	<i>Maianthemum. Convallaria</i>	<i>Maianthemum Convallaria</i>	<i>Phalaris</i>	<i>Phalaris</i>
<i>Puccinia caricina</i>	<i>Urtica dioica</i>	<i>Urtica dioica</i>	<i>Carex</i>	<i>Carex</i>
<i>Thecopsora symphyti</i>	(<i>Abies</i>)	(<i>Abies</i>)	<i>Symphytum</i>	<i>Symphytum</i>
<i>Triphragmium ulmariae</i>	<i>Filipendula ulmaria</i>		<i>Filipendula ulmaria</i>	<i>Filipendula ulmaria</i>
<i>Uromyces pisi</i>	<i>Euphorbia cyparissias</i>	<i>Euphorbia cyparissias</i>	<i>Lathyrus, Pisum</i>	<i>Lathyrus, Pisum</i>
<i>Uromyces scutellatus</i>	<i>Euphorbia cyparissias</i>			<i>Euphorbia cyparissias</i>

subdiv. Agaricomycotina

Order Tremellomycetes

- jelly-like **holothecium**, fungal parasites, saprotrophic on wood

Tremella foliaceae

Tremella mesenterica

Order Dacrymycetes

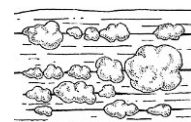
- jelly-like **holothecium**, saprotrophic on wood

Calocera cornea

*Calocera viscosa**



*Dacrymyces stillatus**



Order Agaricomycetes

Order Auriculariales

- jelly-like **holothecium**, saprotrophic on wood

Auricularia (= *Hirneola*) *auricula-judae*

*Exidia plana**



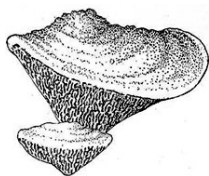
Exidia pithya

Pseudohydnum gelatinosum

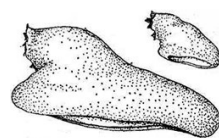
Order Polyporales

- one to several years old **krustothecium**, tree parasites, saprotrophic on wood

Antrodia serialis
Bjerkandera adusta
*Daedalea quercina**
Daedaleopsis confragosa
Fomes fomentarius
Fomitopsis pinicola
*Ganoderma lipsiense**
Gloeophyllum odoratum



Phellinus igniarius
*Piptoporus betulinus**
Polyporus brumalis
Polyporus ciliatus
Polyporus squamosus
Postia stiptica
Trametes hirsuta
*Trametes versicolor**
Trichaptum fuscoviolaceum



Order Russulales

- **pilothecium**, effuse **krustothecium**, ectomycorrhizal, saprotrophic on wood and litter

*Auriscalpium vulgare**
Lactarius rufus
Russula sp.

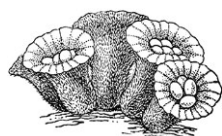


Stereum hirsutum
Stereum sanguinolentum
Stereum rugosum

Order Agaricales

- **pilothecium**, **holothecium**, **cyphelloid**, **gasteroid**, tree parasites, saprotrophic on wood

Agrocybe praecox
Amanita muscaria
*Amanita vaginata**
Armillaria mellea
Bovista plumbea
Calocybe gambosa
Coprinellus micaceus
Coprinopsis atramentaria
*Cyathus striatus**
Gymnopus (= *Marasmius*)
androsaceus
Hypholoma fasciculare
Kuehneromyces mutabilis



Laccaria laccata
Lepista nuda
Lycoperdon perlatum
Lycoperdon pyriforme
Macrolepiota procera
*Marasmius oreades**
Marasmius wettsteinii
Mycena galericulata
Mycena galopus
*Schizophyllum commune**



Strobilurus stephanocystis
Tricholoma sp.

Order Boletales

- **pilothecium**, **gasteroid**, ectomycorrhizal, saprotrophic on wood

Boletus badius
Boletus subtomentosus
*Paxillus involutus**
Rhizopogon luteolus



Scleroderma citrinum
*Tapinella atrotomentosa**
Xerocomellus chrysenteron



Order Geastrales

- **gasterothecium**, ectomycorrhizal, saprotrophic on the

*Geastrum quadrifidum**
Geastrum sessile



litter

Order Hymenochaetales

- *krustothecium*, saprotrophic on wood

Hymenochaete rubiginosa

Fungal-like organisms

Stramenopila

Peronosporomycota (oomycetes, downy mildew)

Order Peronosporomycetes

- obligate plant parasites

Albugo candida *- on Brassicaceae

Bremia lactucae - on Asteraceae

Peronospora alta - on *Plantago*

Hyaloperonospora parasitica - on Brassicaceae

Pseudoperonospora humuli - on *Humulus*

Phytophthora infestans - on *Solanum*

Plasmopara nivea- on Apiaceae

Plasmopara pusilla - on *Geranium*



Amebozoa

Myxomycota (slime molds)

Order Protosteliomycetes

- branched **sporocarps**, on decayed wood

Ceratiomyxa fruticulosa

Order Myxomycetes

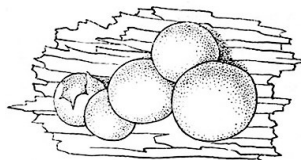
- **sporangium**, **aethalium**, **plazmodiocarp**, on decayed wood and litter

Arcyria denudata

Fuligo septica

Leocarpus fragilis

*Lycogala epidendrum**



Mucilago crustacea

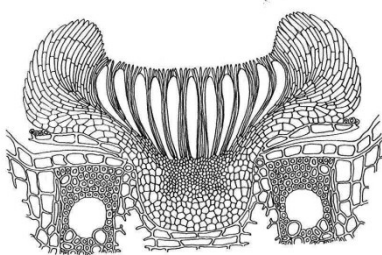
*Stemonitis fusca**

Trichia varia

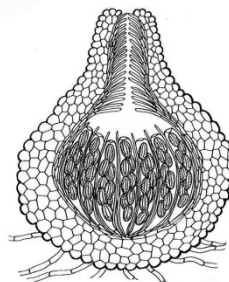


Basic fruiting body types at ascomycetes

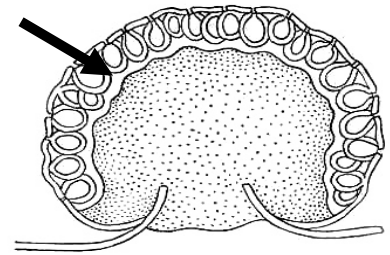
Ascohymenial:



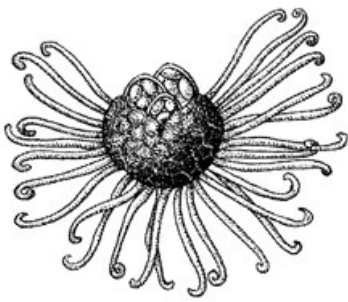
apothecium



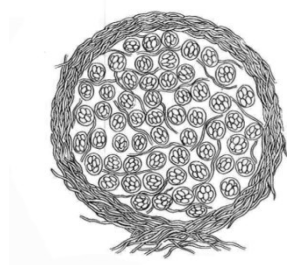
perithecium (free)



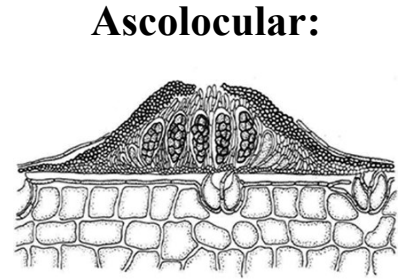
perithecium (in stroma)



chasmothecium



kleistothecium

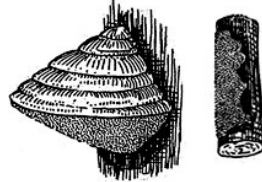


Ascolocular:
hysterothecium

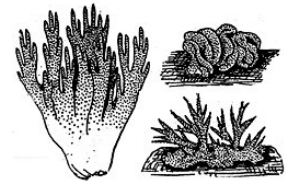
Basic fruiting body types at basidiomycetes



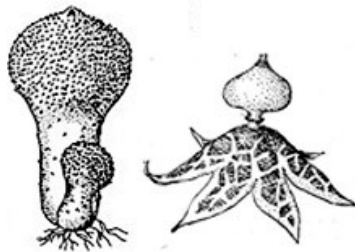
pileothecium



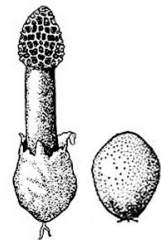
krustothecium



holothecium



gastrothecium



clathrothecium

Life cycle of rust *Puccinia graminis* (Pucciniales, Pucciniomycetes)

