FUNGAL ECOLOGY

(sometimes with special regard to macromycetes)

Fungi and their environment • Life strategies and interactions of fungi • Ecological groups of fungi, saprotrophs (terrestrial fungi, litter and plant debris, wood substrate, etc.) • Fungal symbioses (ectomycorrhiza, endomycorrhiza, endophytism, lichenism, bacteria, animal relationships) • Parasitism (parasites of animals and fungi, phytopathogenic fungi, types of parasitic relations) • Fungi in various habitats (coniferous forests, broadleaf forests, birch stands and non-forest habitats, fungal communities) • Fungal dispersal and distribution • Threat and protection of fungi

(the study material has not been corrected by native speaker)

FUNGI IN VARIOUS HABITATS

According to ecological requirements, fungi of our habitats can be roughly divided as follows:

• species preferring **natural ecosystems**:

– a smaller part of this group is represented by species exclusively bound to natural ecosystems (old-growth forest stands, dry grasslands of steppes or sand dunes, mires and wetlands, alpine treeless vegetation) – the crucial factor that enables survival of the species in these habitats is the continuity of vegetation (for example, for forest species the continuous presence of trees in all stages of development and for lignicolous species in different stages of decomposition is important; a necessary condition for maintaining this condition is a sufficient area of such ecosystems, covering tens to hundreds of hectares);

– most species are able to grow even in changed habitats (see the next point);

• in our country, most fungal species grow in **habitats influenced by man**, such as cultivated forests, bushes, meadows, fields, parks, dams of ponds (of course, many species of natural habitats grow also here);

• strictly **synanthropic species** grow in the centers of towns and villages (ruins, backyards, gardens, dumps, landfills, spoil heaps), they are usually species with ephemeral occurrence.

FUNGI OF CENTRAL EUROPEAN ECOSYSTEMS

In Central Europe, the highest number of fungal species can be found in **forest ecosystems**, both saprotrophic species (on humus and soil, on decaying wood), as well as mycorrhizal and parasitic species.
Greater part of forest stands in Central Europe are cultivated forests, more or less influenced by man (changed species composition, small proportion of dead wood, etc.). However, some types of such forests can host a comparable number of species as natural forests.

In our region, **non-forest ecosystems** (apart from purely anthropogenic ones) are mainly represented by semi-natural meadows and pastures as man-made habitats, while natural habitats include steppes, open mires and wetlands (bogs, fens and reed beds) and alpine non-forest habitats.

Of course, the following overview is far from exhaustive; it is supposed to give at least basic examples of which species you can meet in particular habitats.

Species with wide ecological valence, abundant in various forest habitats:
Terrestrial saprotrophic species are e.g. *Rhodocollybia asema* or *Mycena galopus* (left photo), lignicolous species are e.g. *Mycena galericulata* (top right), mycorrhizal species are e.g. *Amanita rubescens*, *Laccaria laccata* or *Russula cyanoxantha* (bottom right).

Photo Daniel Dvořák (3x)




Spruce forests (mainly cultural ones – mostly monocultures in lower elevations than would correspond to the natural occurrence of spruce)**:** *Hypholoma capnoides*, *Calocera viscosa*, *Postia caesia*, *Postia stiptica*. All lignicolous species, growing mainly on dead wood.




Spruce forests: *Armillaria ostoyae*, saproparasite on trunk bases;
Rhodocybe gemina, *Strobilurus esculentus* and *Gymnopus perforans*, saprotrophs on litter needles or cones.



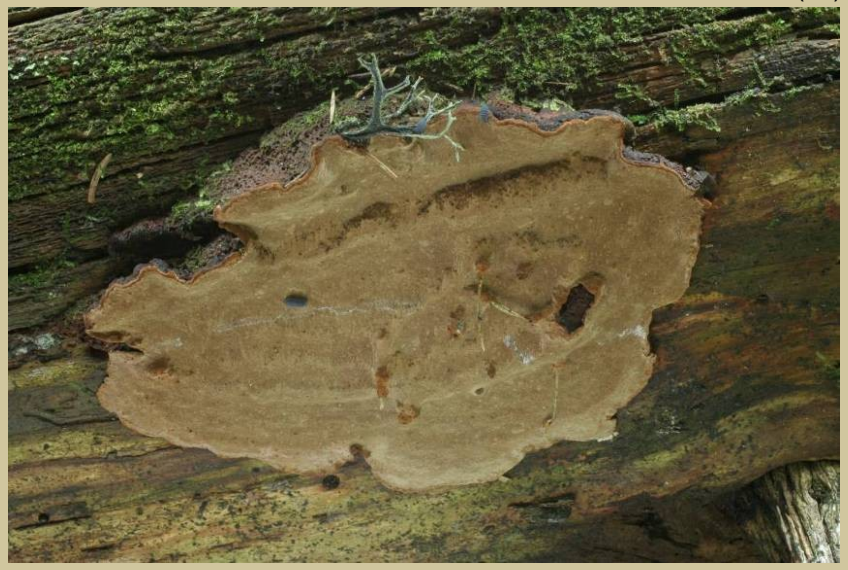
Spruce forests: *Tylopilus felleus*, *Boletus edulis*, *Lactarius deterrimus* and *Hygrophorus pustulatus* – mycorrhizal species.




Acidophilous spruce forests of higher elevations: *Lactarius lignyotus*, *Russula mustelina*, *Amanita regalis*, *Amanita virosa*. All mycorrhizal species.

Natural montane spruce forests: *Climacocystis borealis* – saproparasite on trunks/logs; *Phellopilus nigrolimitatus* (syn. *Phellinus nigrolimitatus*), *Osteina undosa* (syn. *Oligoporus undosus*) – saprotrophs on fallen logs.

Photo Daniel Dvořák (3x)



Note: Natural spruce forests are represented by the climax vegetation of mountain areas (acidic spruce forests with bilberry) and waterlogged spruce forests of lower elevations.

Waterlogged spruce forests: *Cortinarius flexipes*, *Cortinarius tubarius*, *Russula emetica* – mycorrhizal species.

Photo Daniel Dvořák (3x)

Pine forests (both natural forests and cultivated stands)**:** *Tricholoma equestre*, *Tricholoma portentosum*, *Tricholoma terreum* (bottom photo; it often grows also in parks with planted pines). All mycorrhizal species.

Note: Natural forests are represented by the climax vegetation (relict forests) on silicate rocks, peatland forests and pine forests on sandy soils (in this case, however, in many places they are cultural, artificially planted stands).

Pine forests: *Sparassis crispa*, saprotroph on dead wood (often covered with soil); mycorrhizal *Lactarius deliciosus*, *Chroogomphus rutilus*; *Pseudoboletus parasiticus*, parasite on *Scleroderma* species.

Pine forests: *Suillus luteus*, *Suillus variegatus*, *Suillus granulatus*.

Peatland pine forests: *Suillus flavidus*).
All mycorrhizal species.

Pine forests on sandy soils:
Gyromitra esculenta, *Scleroderma citrinum*, *Boletus pinophilus*, *Amanita gemmata*.
All mycorrhizal species (ecology of *Gyromitra* is uncertain, mycorrhizal or saprotrophic).

Larch stands: left photos *Boletinus cavipes* and *Suillus viscidus*, right *Suillus grevillei*.
All mycorrhizal species.

Note: To be exact, they are mixed forests with a predominance of larch; in the Czech Republic, the occurrence of larch is probably natural in the Jeseníky Mts., anywhere else it was planted, the nearest natural occurrence is in Slovakia.

Larch stands: left photos *Lactarius porninsis* and *Gomphidius maculatus*, top right *Hygrophorus lucorum* – mycorrhizal species.
Bottom right *Lachnellula occidentalis*, saprotroph on fallen twigs.