„Biodiversity and ecological system”
Fungi, the hidden network

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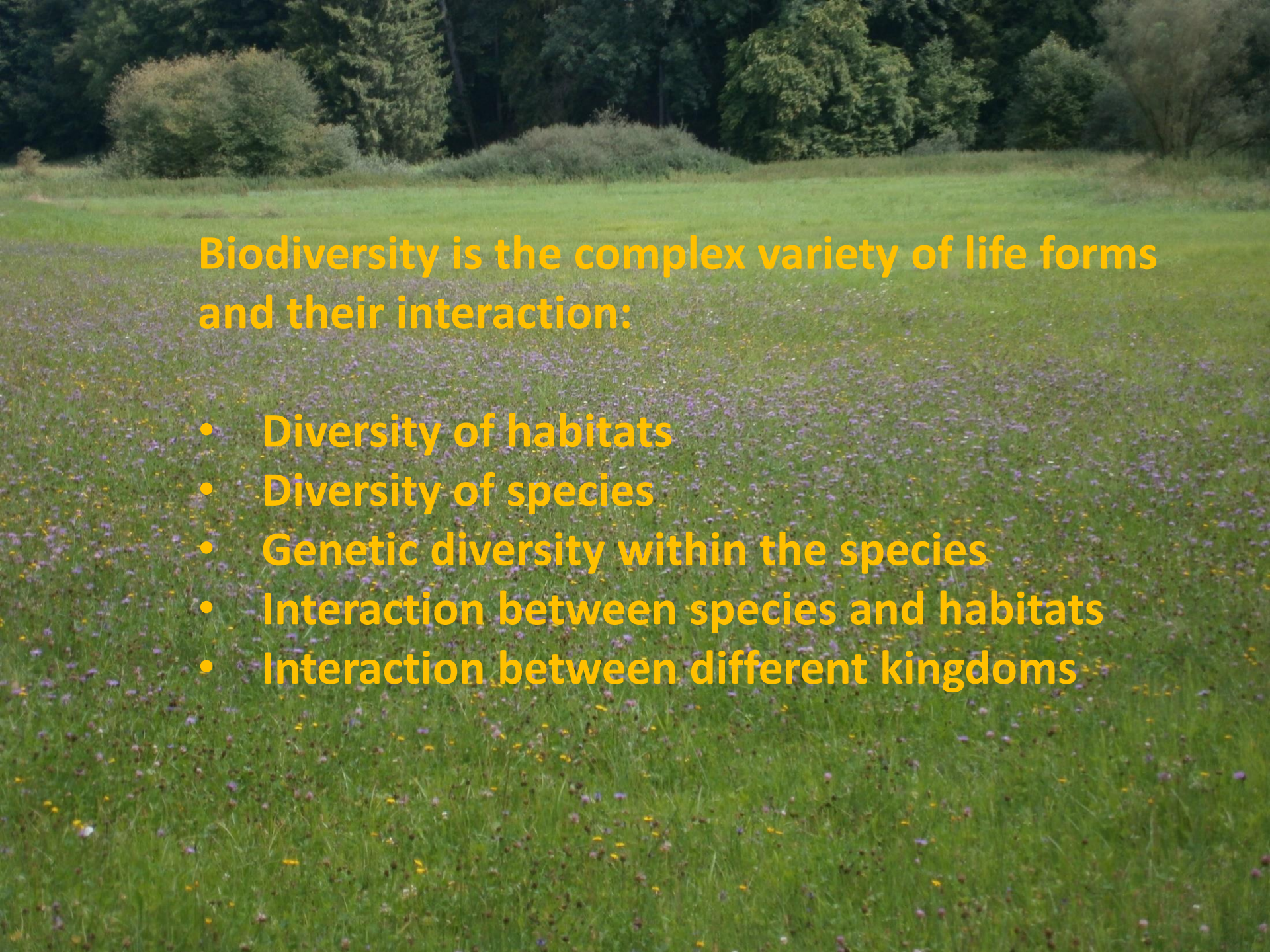
Ecological systems – The kingdom of fungi – what are the differences to the kingdom of plants and animals?

Plants
Autotrophs
no mobility
(only polls and seeds)

Fungi
Heterotrophs
no mobility (only the spores)
chitin in their cell walls

myxomycetes
(slime molds)

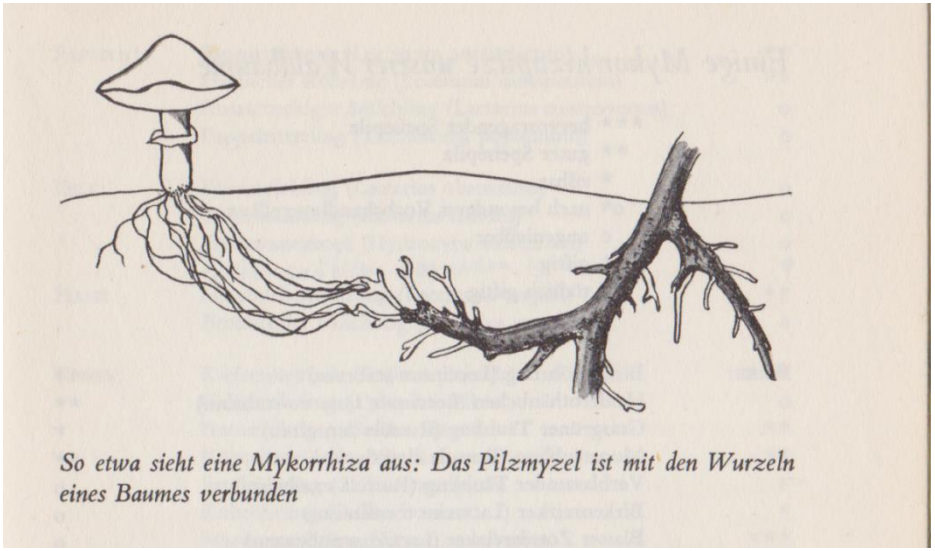
Animals
Heterotrophs
high mobility
no chitin,
(insects have
chitin in their cell walls)



Biodiversity is the complex variety of life forms and their interaction:

- **Diversity of habitats**
- **Diversity of species**
- **Genetic diversity within the species**
- **Interaction between species and habitats**
- **Interaction between different kingdoms**

Interaction between different kingdoms



So etwa sieht eine Mykorrhiza aus: Das Pilzmyzel ist mit den Wurzeln eines Baumes verbunden

Symbionts:
Most of the fungi-species live symbiotic.

Mycorrhiza:
The fungus provides **minerals, salts** and **water** to the trees.

Trees or other plants (*photobionts*) provide **sugars** and other **carbohydrates** via **photosynthesis** to the fungus.

Lichens

Lichens, a special relationship:

Lichens are a symbiotic relationship between **fungi** (*various species)* and **photosynthetic algae** or **cyanobacteria** (*photobiont*).

Habitat:
every ecosystem on all continents,
including polar,
alpine,
semiarid desert regions,
on bare soil,
rocks,
tree bark,
wood,
shells and
leaves.

Mycorrhizal symbiosis
is ancient,
dating to at least 400 million years ago.

King Bolet *Boletus aestivalis*

Porcini mushroom
Boletus edulis


Boletus satanas

How many species can you discover in this ecosystem?

What is their contribution?

All of them live saprobic!

Saprobiont:
They brake down organic matter.

Fungi play an important role in the decomposition of organic matter.

Fungi release carbon, nitrogen and oxygen into the soil and the atmosphere

Agaricus spec.

Hallimasch, Honey-Fungus
Armillaria mellea

The mycelium can reach extraordinary dimensions of (900 ha) and an age of nearly 9000 years!

Armillaria mellea is a parasit!

Interaction between different kingdoms

Bracket-Fungus

Role of fungi in forestry:

Fungi can attack insects and therefore, they can be used as **natural pesticides**.

Pest in the forests are some butterflies.
The caterpillars and chrysalis hibernate in the soil close to their host-tree.

The fungi attacks the insect and kills it.

Kiefernspinner Dentrolimus pini
Kleine Pappelglucke Poecilocampa populi

Use of fungi, an economical factor:

Food - Many fungi are used as food for humans and animals, such as morels,

Hey dog, what are you doing?

It is smelling the truffles.

Many fungi are used as food for humans and animals.

Yeast, a type of fungi, is used when baking bread to help it rise and to ferment beverages like beer and wine.

More important uses of fungi:

Medicine - Some fungi are used to kill bacteria that can cause infections and disease in humans. They make antibiotics like penicillin and cephalosporin.

Role of fungi:

Medicine - Some fungi are used as a medicine against cancer.


Role of fungi:
Some are indicator species
of healthy old habitats.
2008/ 9/30


Some are indicators for climate change.
Polyporus mori Waben-Porling

Overview:
Mushrooms are an important factor in **producing food** for animals and humans.

Yeasts have been used for thousands of years in the production of beer, wine, and bread.

Fungi produce substances that humans use as **medicine**,

They are versatile tools in the vast field of **medical research.**

Some fungi attack insects and, therefore, can be used as **natural pesticides**.

Some are **indicator species of healthy old habitats.**

Some are **indicators for climate change,**

and some are used as "**magic mushrooms**".

Overview:

Fungi play vital roles in the **biosphere**.
They are essential to the **recycling of nutrients** in all terrestrial habitats because they are the dominant **decomposers** of the complex components of plant debris, such as cellulose and lignin.

They are returning their minerals to the soil and gases to the air, thus making them available for the next generation of plants and animals and **ensuring the continuous natural cycle of life.**

The majority of grasses and trees require a **mycorrhizal** relationship with fungi to survive.

The fascinating world of fungi

Zunderschwamm
Tinder Polypore
Fomes fomentarius

Practical problems in conservation and for biodiversity are:

- loss of species
- destruction of habitats
- introduced and invasive specie
- genetic pollution
- over-exploitation
- effect of climate change


I wish you
many wonderful experiences
and
good luck for the test!
Dr. Ute Künkele