

Heslop-Harrison 1976, p.119). Thus, bacterial enzymes improve the digestive system of most carnivorous plants.

I tested the bacterial influence on the digestion of the prey, using *Bacillus cereus* as a test organism, in a project for the "Swiss Contest for Young Scientists". Many different carnivorous plants were examined in order to find out if *Bacillus cereus* lives in the digestive system. The occurrence of *Bacillus cereus* was tested using agar plates in 131 samples of digestive liquids and trap partitions of carnivorous plants (samples of *Heliamphora*, *Cephalotus*, *Nepenthes*, *Sarracenia*, *Dionaea*, *Pinguicula*, *Drosera*, *Drosophyllum*), 15 samples from substrate around the carnivorous plants (water, soil, moss), and 20 samples from potential prey. In the samples of *Heliamphora*, *Bacillus cereus* was always present. It was proven that *Bacillus cereus* is ubiquitous. Moreover, it was confirmed with special cultures that *Bacillus cereus* is a facultative anaerobic bacterium. Experiments have also shown that *Bacillus cereus* produces and secretes amylases (method: "coloured starch-agar-plates", Birkenbeil, 1983, p.95), lipases (method: "optical change and change of the pH-value of a supernatant-oil-mixture", Stellmach, 1988) and proteases which can digest polypeptides and peptides (photospectroscopical measurements and gel electrophoresis). Besides there was an effort to clean and measure the size of the amylases of *Bacillus cereus* and to compare the size with the protein sizes in different digestive liquids of carnivorous plants. By different plate-cultures we observed that when numerous colonies of *Bacillus cereus* are present, nearly no other bacteria were able to grow. Final conclusion: *Bacillus cereus* and other bacteria probably play an important role in the digestive system of carnivorous plants.

References

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Flora and Fauna of the "Bernrieder Filz" Nature Reserve (Southern Bavaria, Municipality of Seeshaupt)

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The "Bernrieder Filz" is a characteristic prealpine raised bog with a vegetation dominated by mountain pine (*Pinus mugo* TURRA), heath (*Calluna vulgaris*) and different *Sphagnum* communities.

The high diversity of habitats makes it suitable not only for most of the native carnivorous plant species, but also for a large quantity of other plants and animals adapted to bog ecosystems.

During a research period of two years, the author investigated the flora and fauna of the "Bernrieder Filz" and the local mobility of the animal and plant species found. Special emphasis was laid on the vegetation and fauna of the different biotope types lying on the edge of the asymmetric peat bog.

About 400 different species were found in an area of approx. 0.5 km² (130 acres) and mapped out in a topographical 1:5000 map. Furthermore, aerial pictures were analyzed and the vegetation communities found were assigned to 17 sub-units.

For each of the subunits, the percentage of endangered animal and plant species was calculated using the "red lists" of endangered species for Bavaria (P. Schönfelder, 1988; G. Heusinger, 1992). In addition, the extent of their local mobility was measured.

Using these data, a protection and management concept for the "Bernrieder Filz" was developed and an extension of the nature reserve area was proposed.

In the southern part of the "Bernrieder Filz" there lies a small lake called "Schwarze Lache" with large areas of floating vegetation (quaking mat) and sedge-dominated aspects in which different endangered dragonfly species such as *Nehalennia speciosa* and *Sympecma paedisca* can be found. The "Schwarze Lache" area can be classed as the heartland of the bog.

The northern parts of the "Bernrieder Filz" are dominated by the *Pinus mugo-Vaccinetum* plant community, with decaying draining ditches and a lake remnant with transitional peatland vegetation. Most of the drainage ditches have been blocked by local naturalists in order to rewet dried-out areas. About 60% of the species of the lake remnant region can be regarded as highly endangered.

On the edge of the nature reserve, a great variety of different biotope types can be found: fishponds, spruce and beech woods with thermophilic edge vegetation, meadowlands with cattle breeding and extensively cultivated flat bogs (meadows) on slightly acid, mesotrophic peat.

Especially the meadows, which are cut only once a year in order to harvest straw, are inhabited by interesting sedge (Cyperaceae), rush (Juncaceae), orchid (Orchidaceae) and gentian (Gentianaceae) species as well as butterflies (Lepidoptera), grasshoppers (Saltatoria) and beetles (Coleoptera). This meadow area plays an important role in the interrelations between tyrphobiotic species and those of the edge biotopes, 50% of which are endangered.

After two years of field research, it can be concluded that not only the heartlands of the bog itself, but also the edge biotopes are inhabited by valuable and peculiar animal and plant species. In summary, one can say that the nature reserve area should be extended in order to create a biotope complex of sufficient expanse. The rewetting measures in the Northern parts as well as the extensive cutting of the "Streuweisen" should be promoted.

The *Pinguicula* of the Caribbean

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The six *Pinguicula* species found in Cuba and the Dominican Republic are discussed. Cuba is the largest and oldest Caribbean Island, and contains three mountain ranges which reach approximately 3000 metres elevation. The five species of *Pinguicula* (*P. filifolia*, *P. albida*, *P. jackii*, *P. benedicta* and *P. lignicola*) listed for Cuba are all endemic.

P. filifolia grows in the West of Cuba in the Pinar del Rio region. *P. filifolia* appears to compete with the grasses, and there is evidence that grazing may create suitable habitat. The plant itself is grass-like, upright to about 20 cm with long but erect leaves. Flowers are held high above the leaves on thin stalks and are varying shades of blue, white or yellow. *P. filifolia* is threatened because its environment is rapidly being damaged by citrus farming.

P. albida is found in the same area. This is a small rosetted plant, barely five cm in diameter. The leaves are very thin, almost transparent. It hugs the ground under the shade of juvenile palm trees. This plant is an annual and can be found only near the start of the rainy season. White flowers are produced throughout the plant's life cycle. *P. albida* grows in areas poorly suited to cultivation, so the plant is not severely threatened. However, expanded farming or draining would quickly threaten the Pinar del Rio colonies.

P. jackii grows in the Trinidad mountains. It is a large rosetted plant which grows flat against vertical cliff faces and bears purple flowers. Very few sightings and no recent collections of this species have been made despite two visits and an enthusiastic search throughout the area. One site known to have plants in 1995 has been lost to vegetation and soil damage from pigs.

The small plant *P. benedicta* was found at high altitude. Its habitat may be threatened by pollution from nearby mining.

P. lignicola is a rare and stunning example of an epiphytic *Pinguicula*. Plants less than 5 cm in size were found at high elevation growing attached directly to the bark of trees. At this high altitude, temperatures are high during the day but fall rapidly at night, resulting in fog each night. The altitude also