Abstract

Actinobacteria are important bacterial group participating in various ecosystem processes particularly in the decomposition of complex organic compounds. Their abilities enable them to surviving in harsh conditions of oligotrophic habitats like lakes, deserts, cave walls or recalcitrant and resistant litter in soil, where *Actinobacteria* often dominate. Although certain biotic and abiotic factors were recognized to modulate *Actinobacteria* incidence in such habitats, the influence of anthropogenic pressure on their communities is scarcely known. The main objective of this thesis is therefore to determine differences of *Actinobacteria* communities under the direct (the human visitors changing microenvironment of caves, **part 1**) and indirect (climate change factors like altered precipitation or plant litter quality, **part 2**) anthropogenic influence in two habitats, plant litter in soil and cave walls, where *Actinobacteria* play important roles and dominate.

In a first part of the thesis we monitored *Actinobacteria* communities in French limestone caves walls differently affected by humans (pristine versus anthropized caves). For identification of important species like potential pathogens or pigments producing *Actinobacteria* using amplicon sequencing of environmental DNA (Illumina MiSeq), we firstly used a molecular marker gene *hsp*65 coding for heat shock protein specific for *Actinobacteria*. Special attention was payed to anthropogenically most affected Lascaux Cave with Paleolithic paintings. There, a comparison of different rooms differently affected by a human-derived intervention as well as between visual dark marks and unmarked areas on the wall paintings were compared **(paper I)**. In the second part, we monitored litter *Actinobacteria* communities during a decomposition process under manipulated precipitation **(paper IV)**, on different litter type, quality and origin **(papers II, III, IV)** in different forests including Mediterranean oak and pine forests **(paper IV)**, mountainous spruce and beech forests **(paper III),** a beech temperate forest **(paper II)**) and also one grassland **(paper II)**.

Our results show that *Actinobacteria* communities were strongly dependent to anthropized/pristine status of caves (**Part 1**) as well as climatic and litter quality changes during the decomposition (**Part 2**). In caves (**Part 1**), *Actinobacteria* community structure indicated the anthropogenic disturbance, because typical pristine and anthropogenic taxa identified according to the *hsp*65 marker were recovered in relation to an anthropization status **(paper I)**. Moreover, the dominance of *Streptomyces* was found in the area with visual dark marks

suggesting the marked areas were factor influencing this group **(paper I)**. During decomposition (**part 2**), we found that *Actinobacteria* were **i)** affected by litter type regardless its origin but their dominance on recalcitrant litter type did not result in faster decomposition **(papers II, III, IV)**, **ii)** not directly affected by climatic conditions **(paper III, IV)** but were site-specific **(papers II, III, IV)** with a potential to dominate introduced coniferous forests **(papers III, IV)**, **and iii)** in decomposition process had opposite strategies to fungi, since were influenced by different conditions than fungi **(papers II, III, IV)**. Overall, *Actinobacteria* respond to anthropogenic pressure on a community and species level and are also able to adapt to harsh conditions and thus, these changes leading to *Actinobacteria* persistence in ecosystems. Consequently, *Actinobacteria* might be considered as stress-tolerant microbes, which may also benefit from man-made disturbances.

Key words: *Actinobacteria*, caves, decomposition of plant litter, climate change, anthropization, *hsp*65 marker, fungi