

## Abstract

This thesis follows previous works of our group (Rieger T. *et al.*, 2008; Cepl J. *et al.*, 2010 and Patkova I. *et al.*, 2012), where we focused on the morphology of the bacterial colonies *Serratia marcescens* and its variety caused by changing of the inoculation conditions on nutrient agar. When bacterial colonies *S. marcescens* are grown on nutrient agar enriched with glucose isolated enough from other colonies in its living space, it can form coloured structured colonies, which we named morphotype „fountain“ (**F**). This morphotype becomes ideal for following studies of mutual influencing of the bacterial colonies, because of its ability of pigmentation change or structure loss caused by altering surrounding inoculation conditions.

We noticed in normal sowed agar plates, that bacterial colonies, which grows in the close distance with other colonies develop their pigmentation sooner, than colonies, that grows more isolated. We studied how is this influencing happening and what are the necessary conditions for it. We proved, that different species of bacterial macrocolonies (*S. marcescens* – morphotype (M), *S. rubidea* and *E. coli*) emits into the nutrient agar informative signal, which makes the recipient colonies *S. marcescens* reacts on this signal with the same manner (X structure). It looks, that this is kind of universal reaction on some compounds emitted by different species of Enterobacteria.

Growth of the **F** morphotype on minimal agar is conditional on its induction by growing heterospecific or conspecific macrocolony nearby. In the work on signal molecule identification we found out, that growing macrocolony of *S. rubidea* (**R**) emits to distant agar (up to few centimetres) protein, which we identified as hypothetical protein (35KDa) of *Serratia marcescens* „WP\_025304701.1“ with 100 % identity. Nevertheless filtration of the functional minimal media obtained from growing fluid culture of **R** morphotype through the membrane with cut-off 3500Da proved, that the induction of the growth of **F** colony on minimal agar plate is not made by this protein.

Medium obtained from the growing fluid culture of the **R** morphotype, when is deprived from the bacterial cells, induce growth of **F** colony when is added on the minimal agar plate. In the next part of this thesis we tried to identify signal molecule that is contained in the minimal medium obtained from the fluid culture of **R** morphotype by modern biology analytic methods. We detected that possible signal molecule can be short thermostable peptide of approximate mass 3284 Da.

We believe, that this thesis can act as a solid base for further study, that can lead, with optimization of purging methods, to identification of the signal molecules emitted and received by different species of Enterobacteria and thus contribute to our knowledge of intra – and inter-species communication of microorganisms.