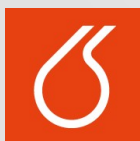


Matematika a bakteriálne kolónie



Vladimír Scholtz



VYSOKÁ ŠKOLA
CHEMICKO-TECHNOLOGICKÁ
V PRAZE



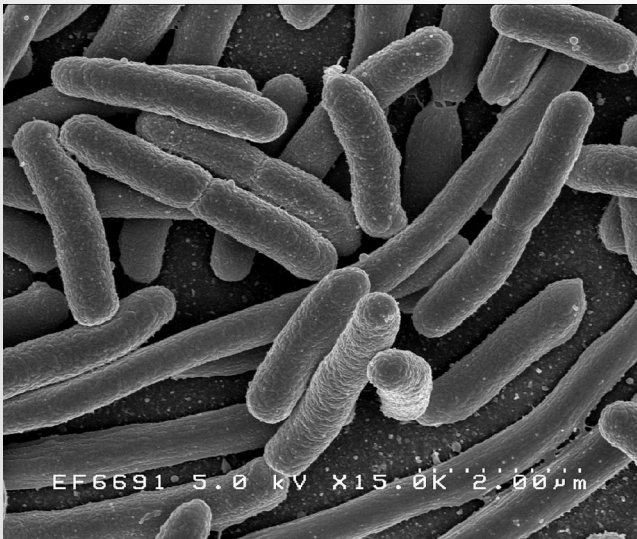
Ústav fyziky
a měřicí techniky
Department of Physics and Measurements

Laboratoř nízkoteplotního plazmatu



Trochu mikrobiológie

- Baktérie a iné mikroorganizmy
- Nepohlavné rozmnožovanie
- Metabolizovanie živín na odpadné látky
- Rôzne metódy kultivácie
- Kultivácia na polotekutom médiu



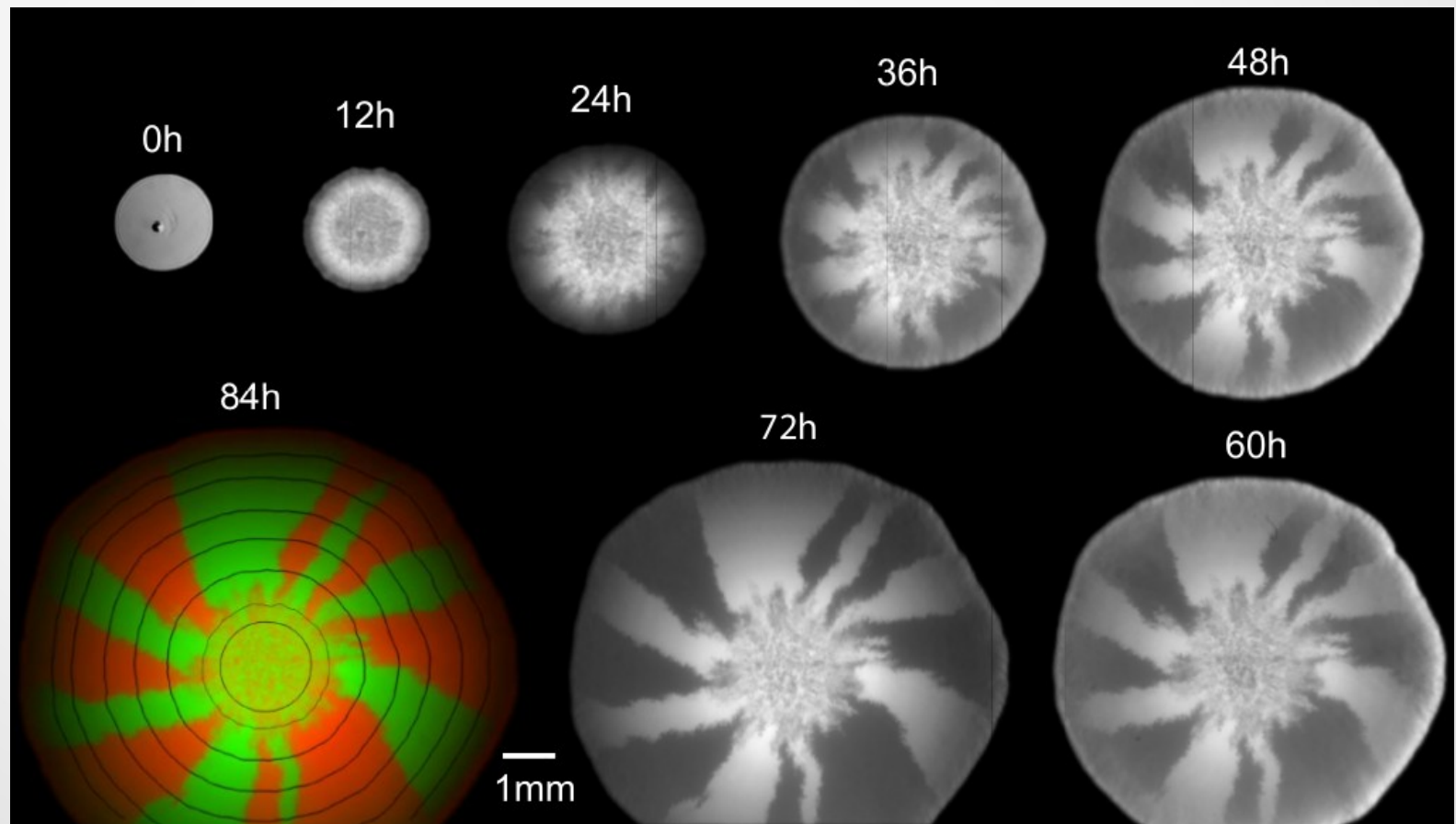
Matematický aparát

- Logistická rovnica
 - Bez obmedzenia
 - S obmedzením
- Difúzia
 - Fickove zákony
- Reakčne-difúzne modely
- Opitý námorník (náhodná prechádzka)

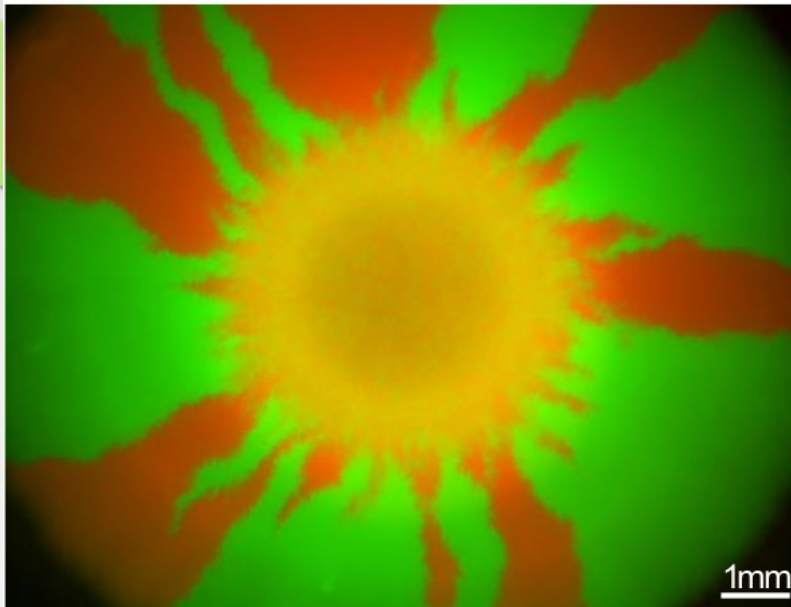


Opitý námorník

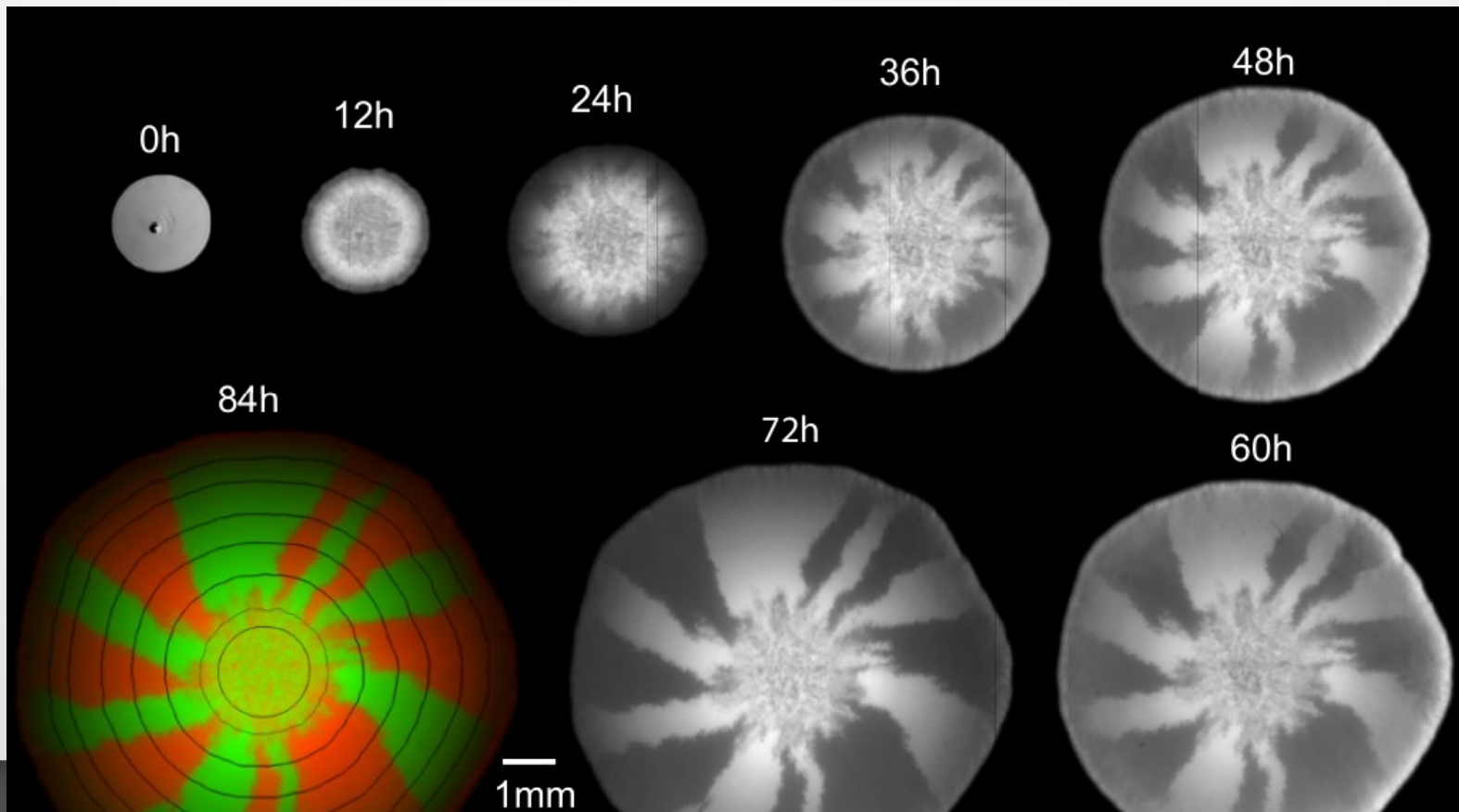
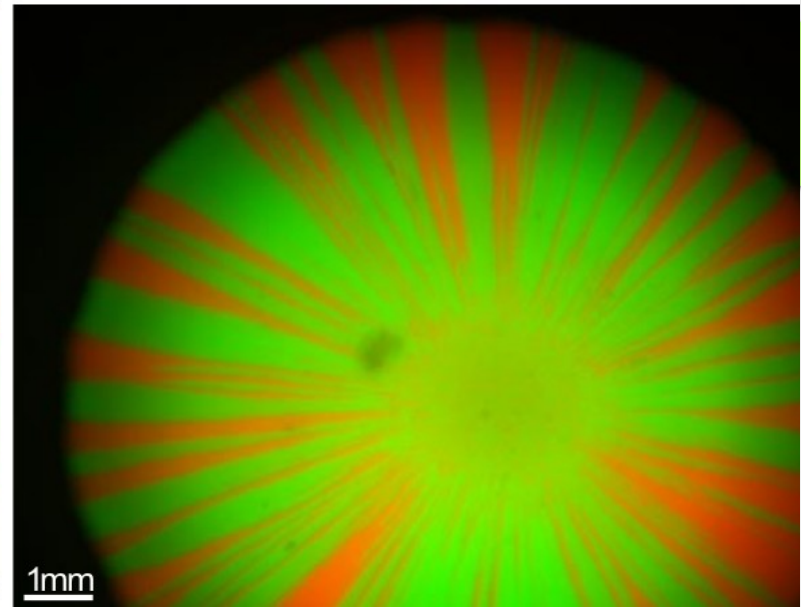
- V. Scholtz: Opitý námorník a rast baktérií na hranici expandujúcej populácie, Aldebaran bulletin, 4/2015
- O. Hallatschek, P. Hersen, S. Ramanathan, D. R. Nelson: Genetic drift at expanding frontiers promotes gene segregation; Proceedings of the National Academy of Sciences of the United States of America 104 (50) (2007) pp. 19926-19930

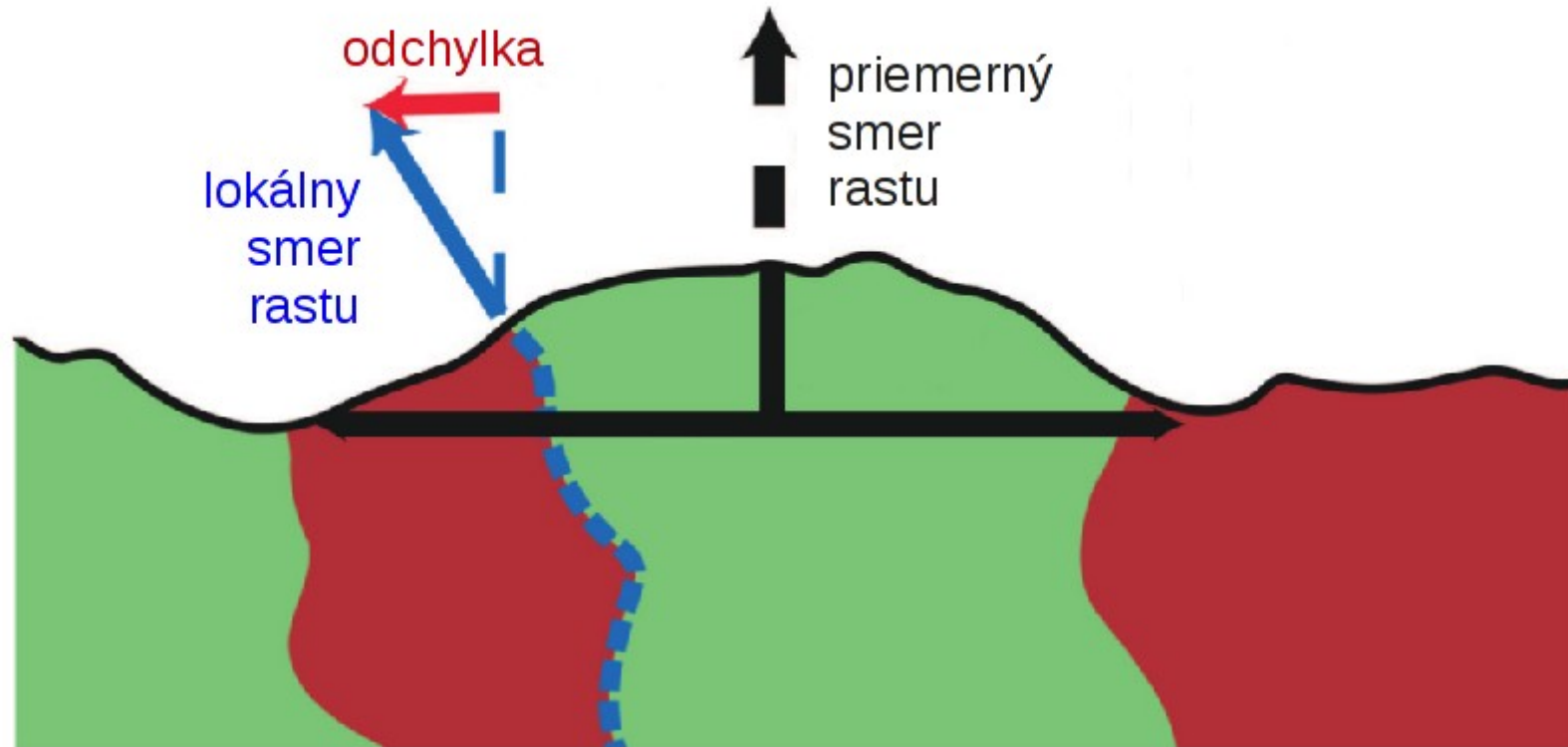
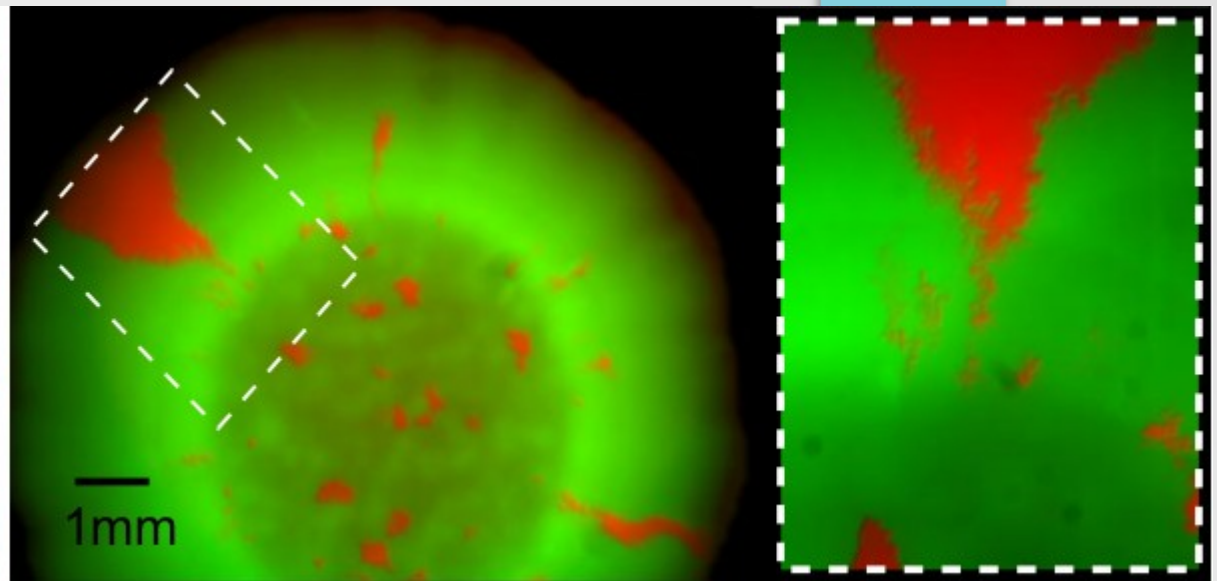
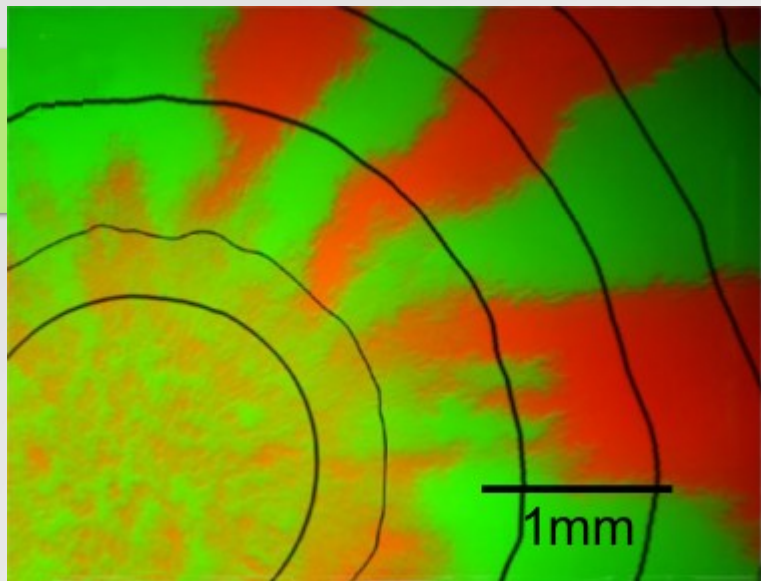


E. coli



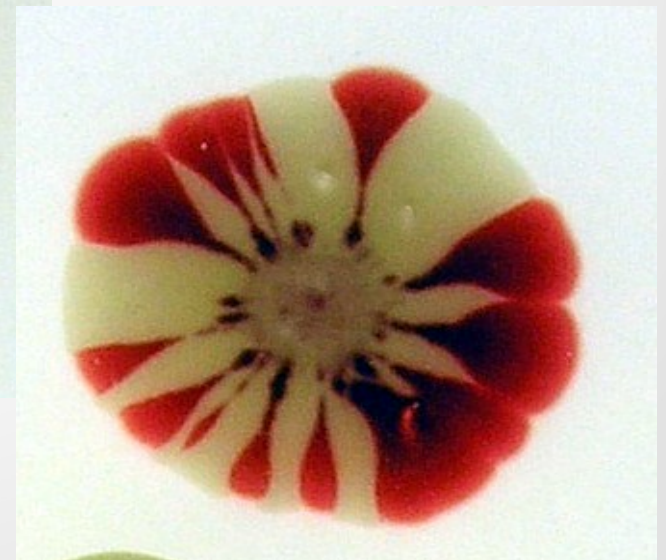
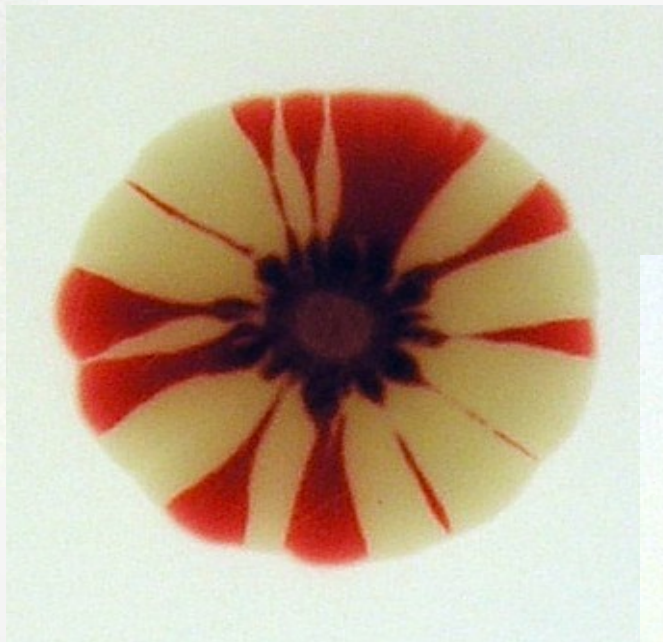
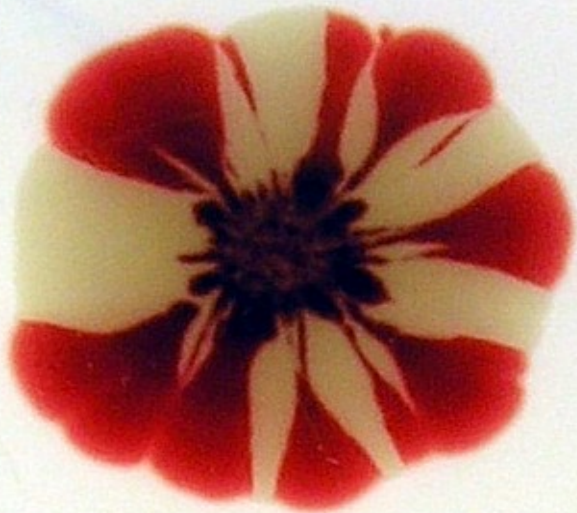
S. cerevisiae



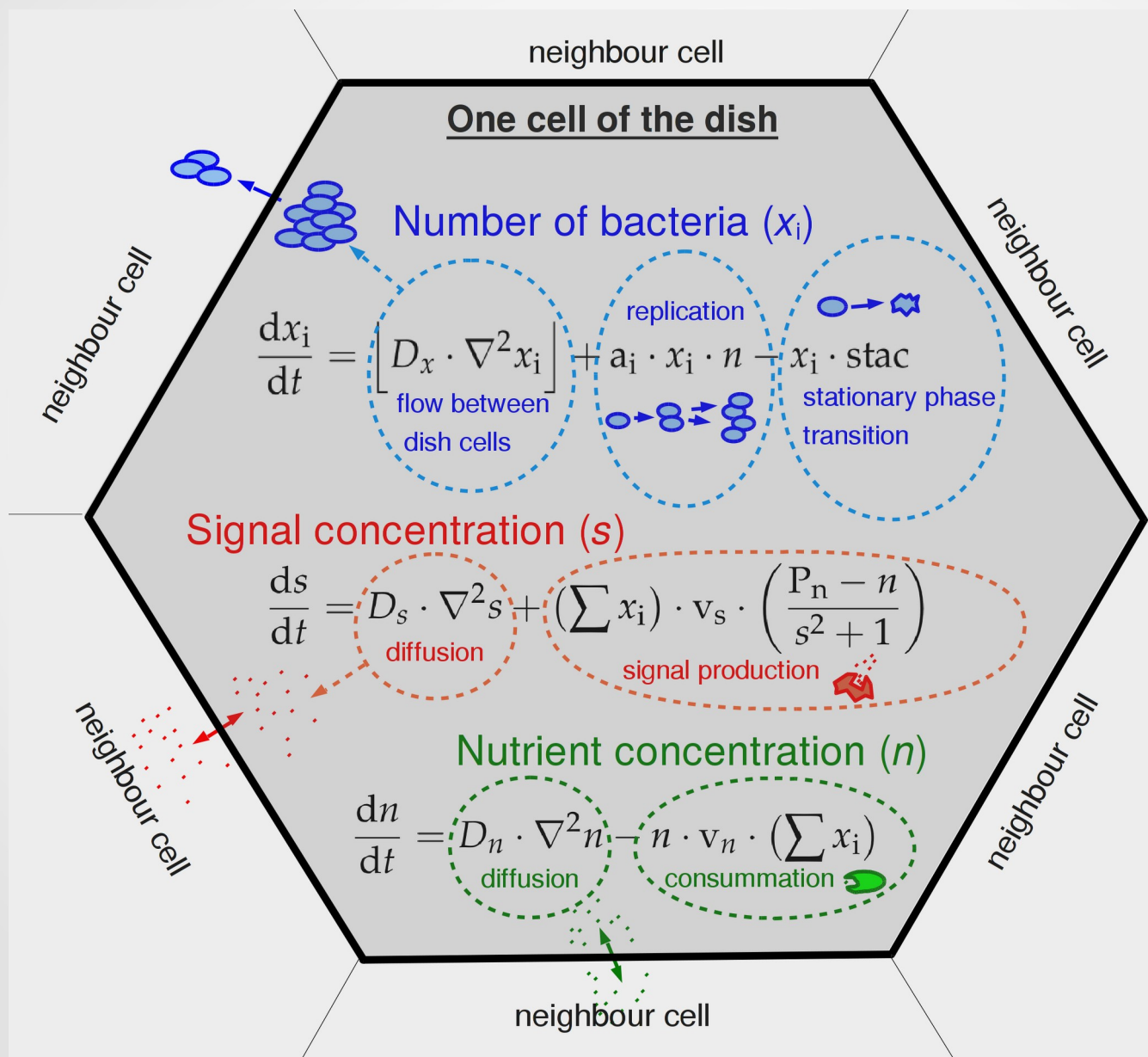


- Reakčne-difúzny model: *Serratia rubidaea*

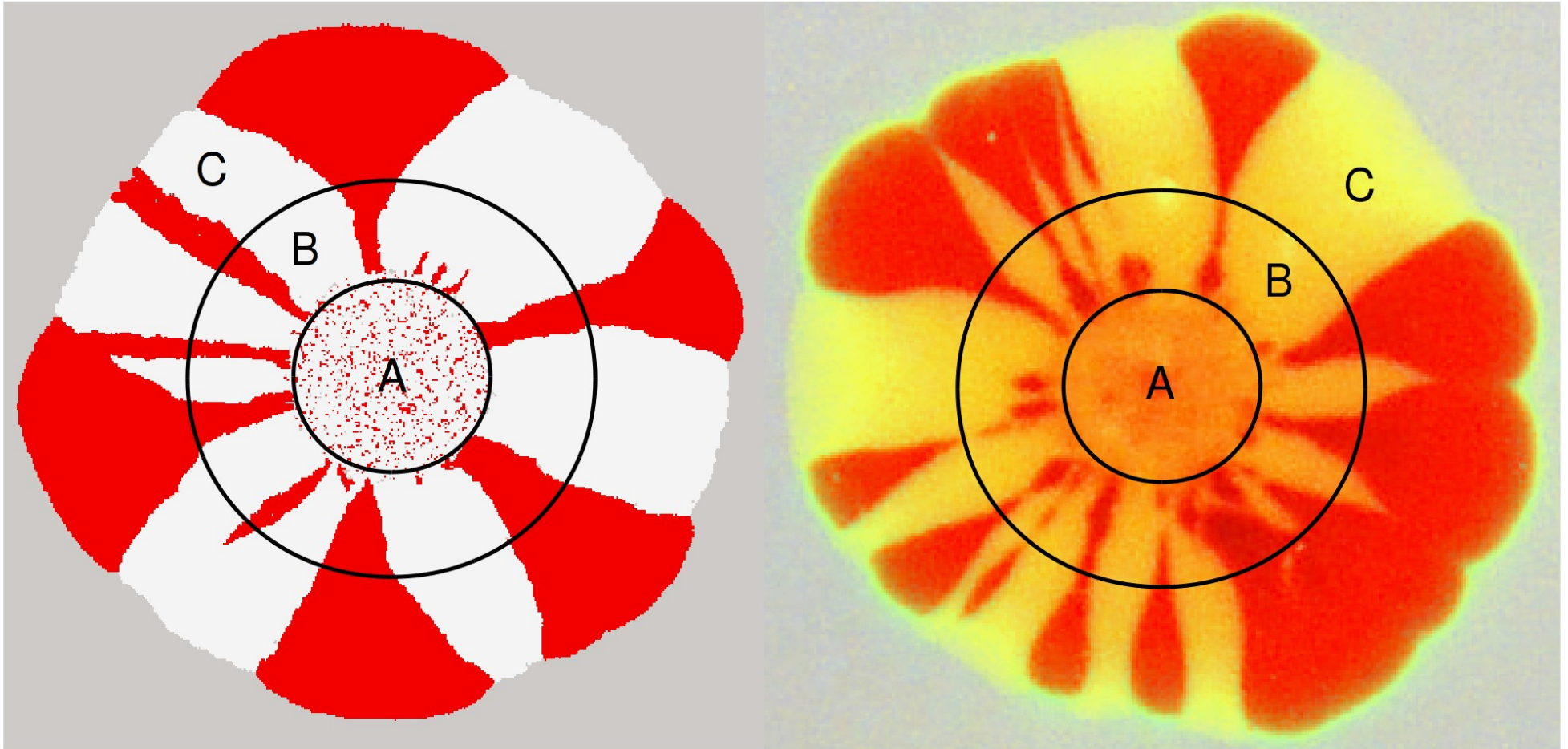
- Čepl, Jaroslav, Vladimír Scholtz, and Jiřina Scholtzová. "The fitness change and the diversity maintenance in the growing mixed colony of two *Serratia rubidaea* clones." Archives of microbiology 198 (2016): 301-306.

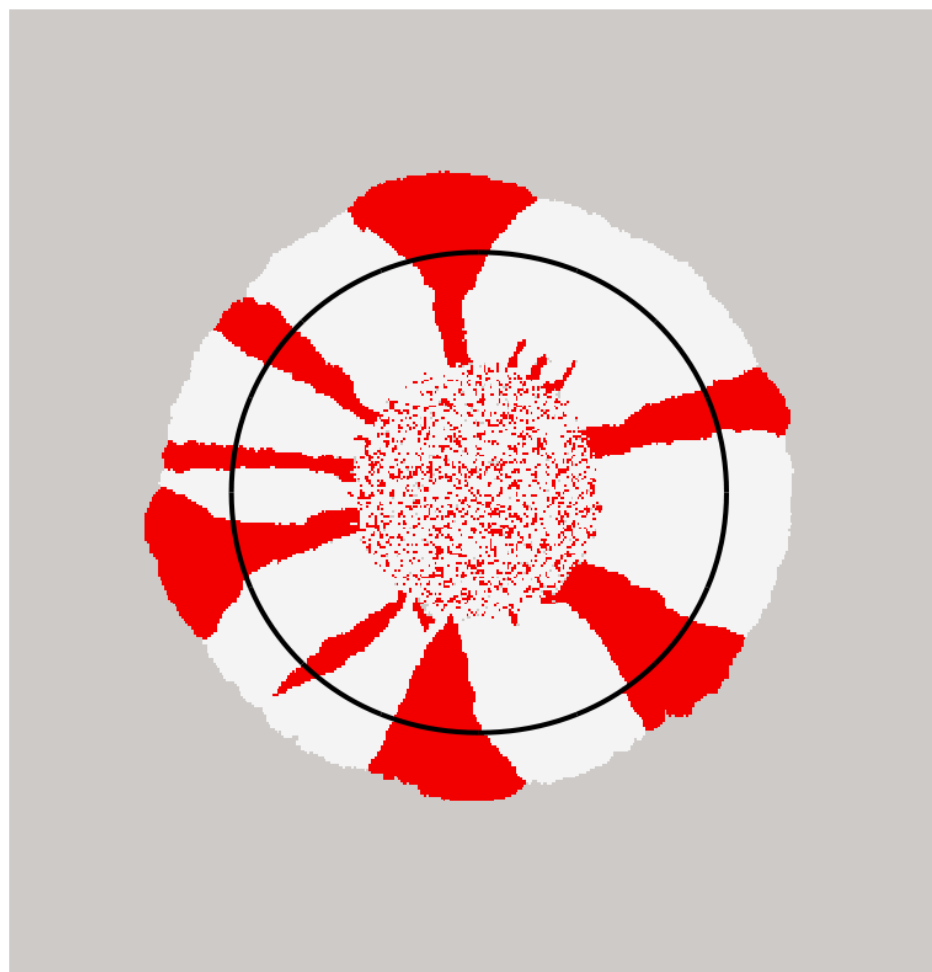
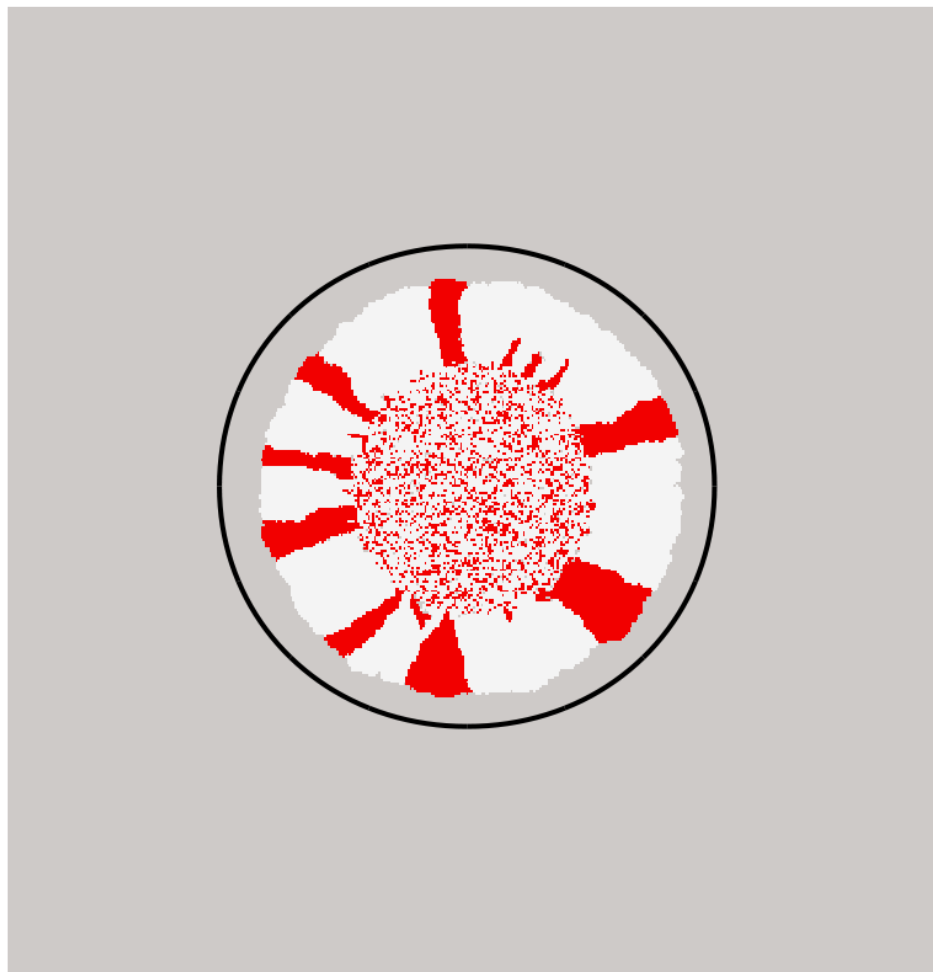
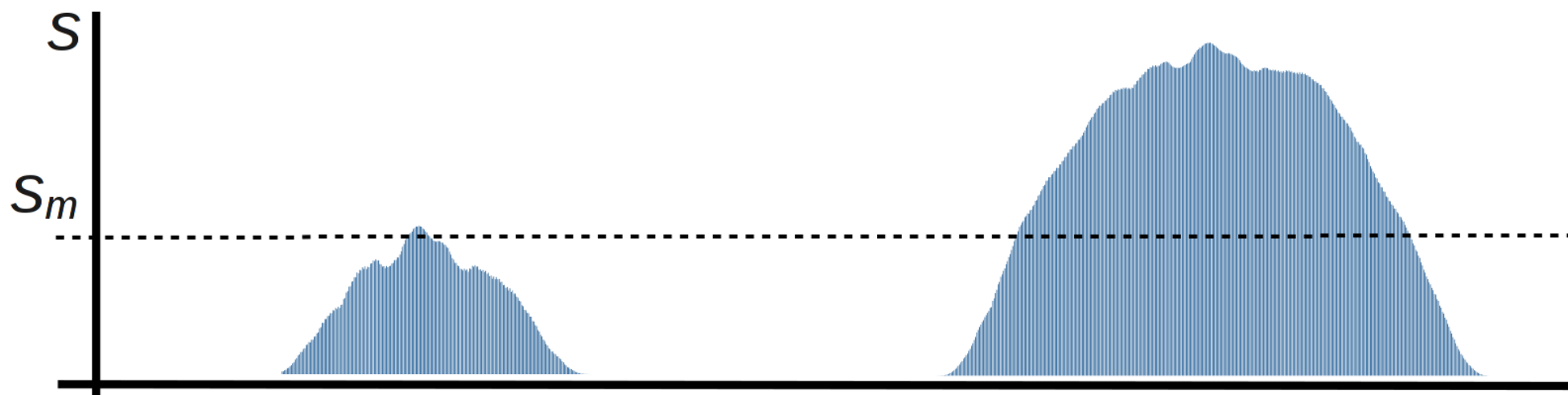


- Reakčne-difúzny model: *Serratia rubidaea*



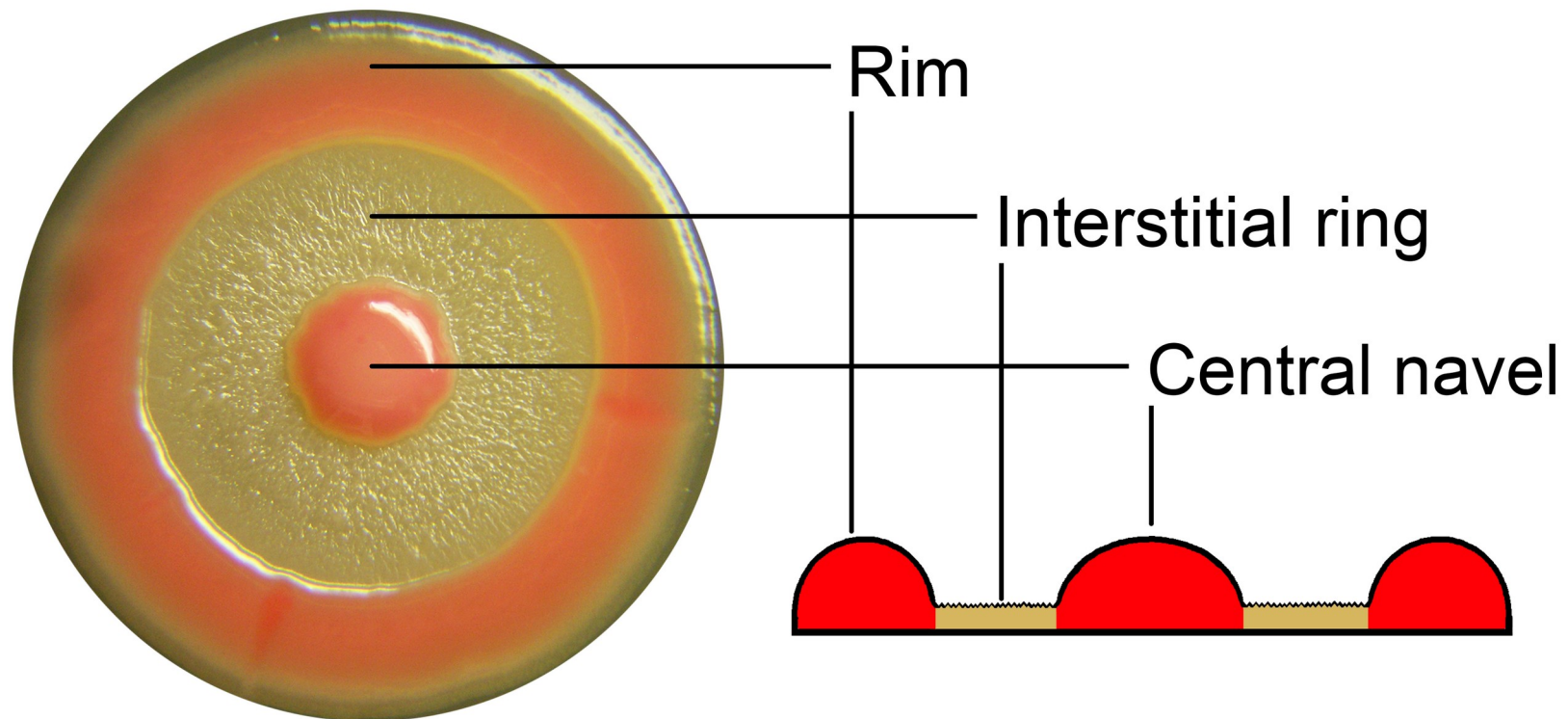
- Reakčne-difúzny model: *Serratia rubidaea*



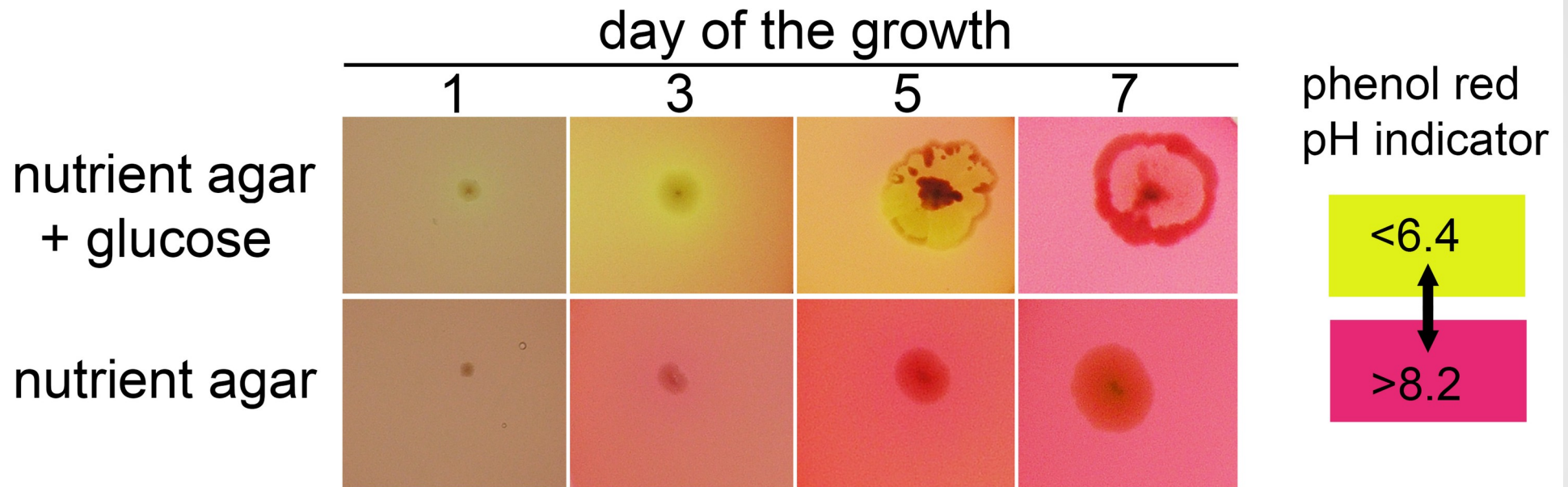


Reakčne-difúzny model: *Serratia marcescens*

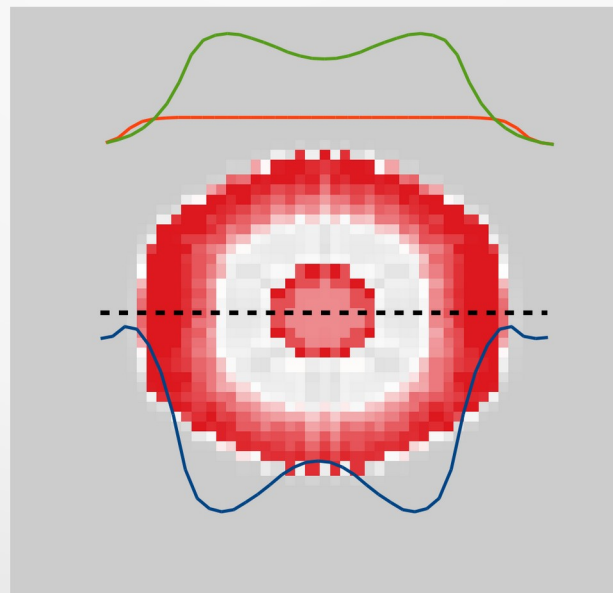
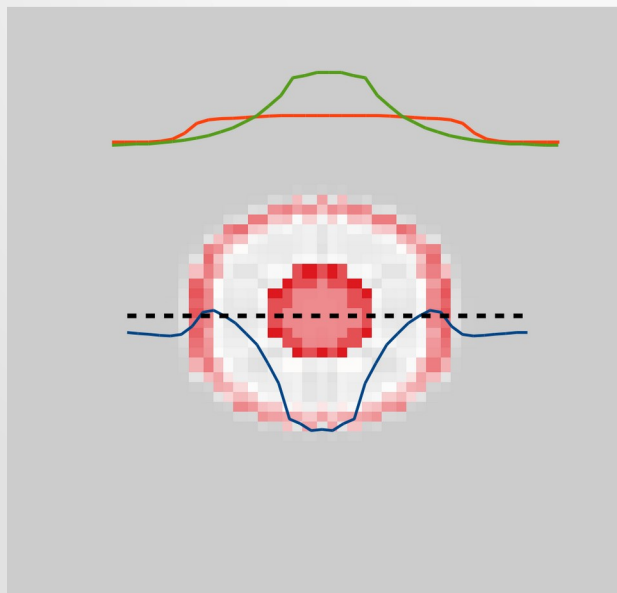
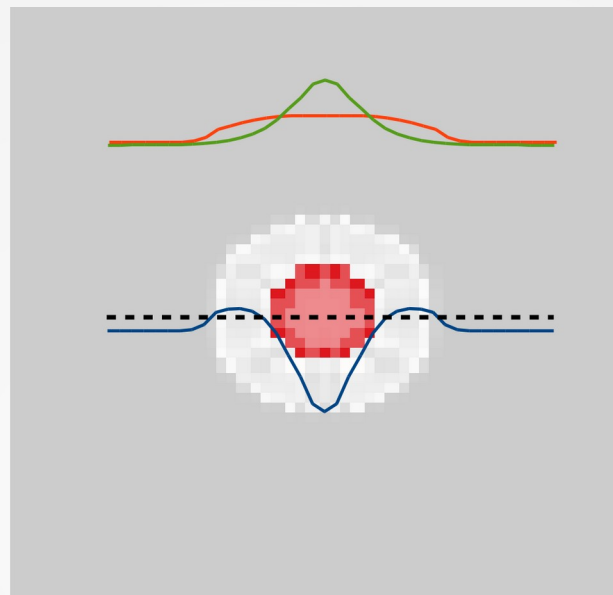
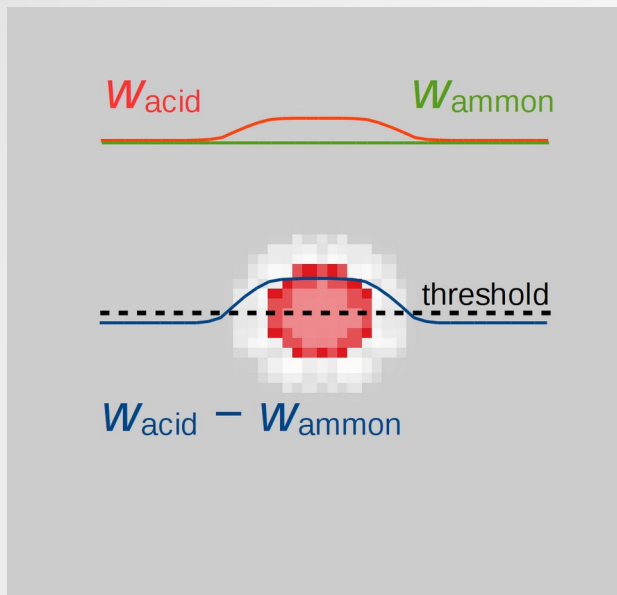
- Čepl, Jaroslav, Vladimír Scholtz, and Jiřina Scholtzová. "Modeling of concentric pattern of *Serratia marcescens* colony." *Archives of Microbiology* 201 (2019): 87-92.



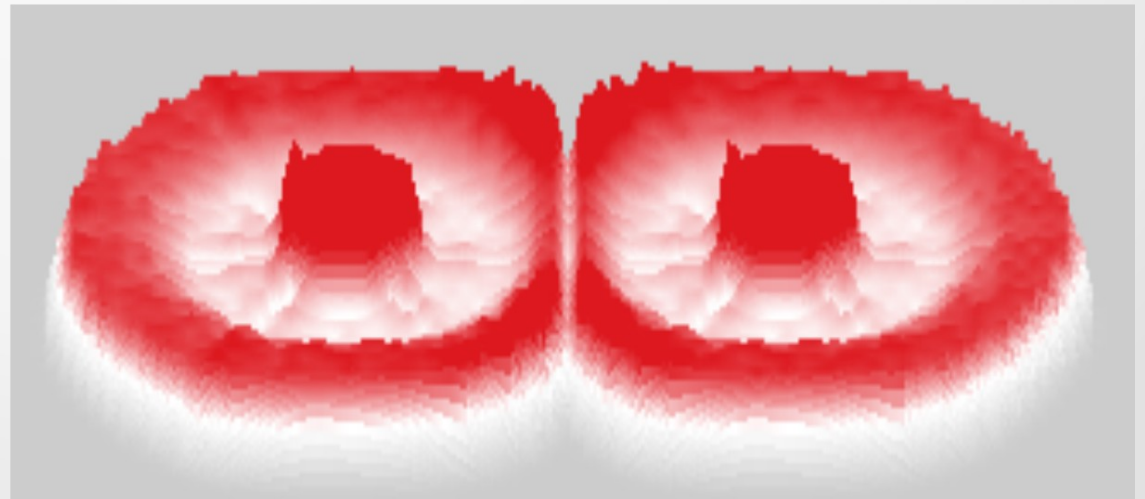
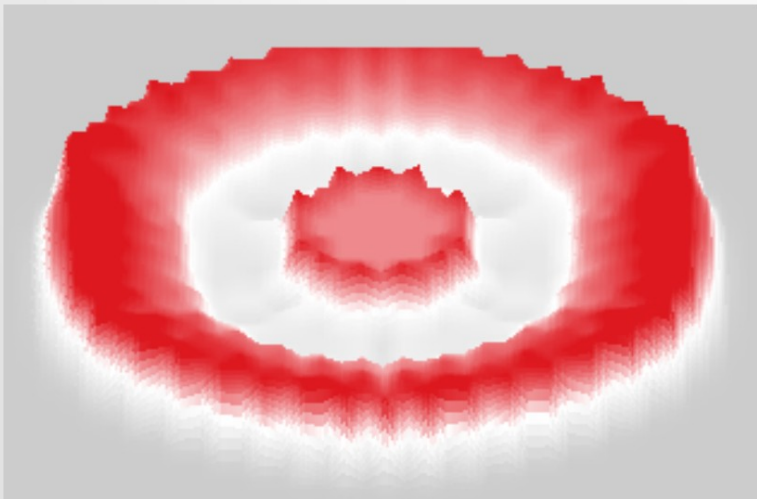
- Reakčne-difúzny model: *Serratia marcescens*



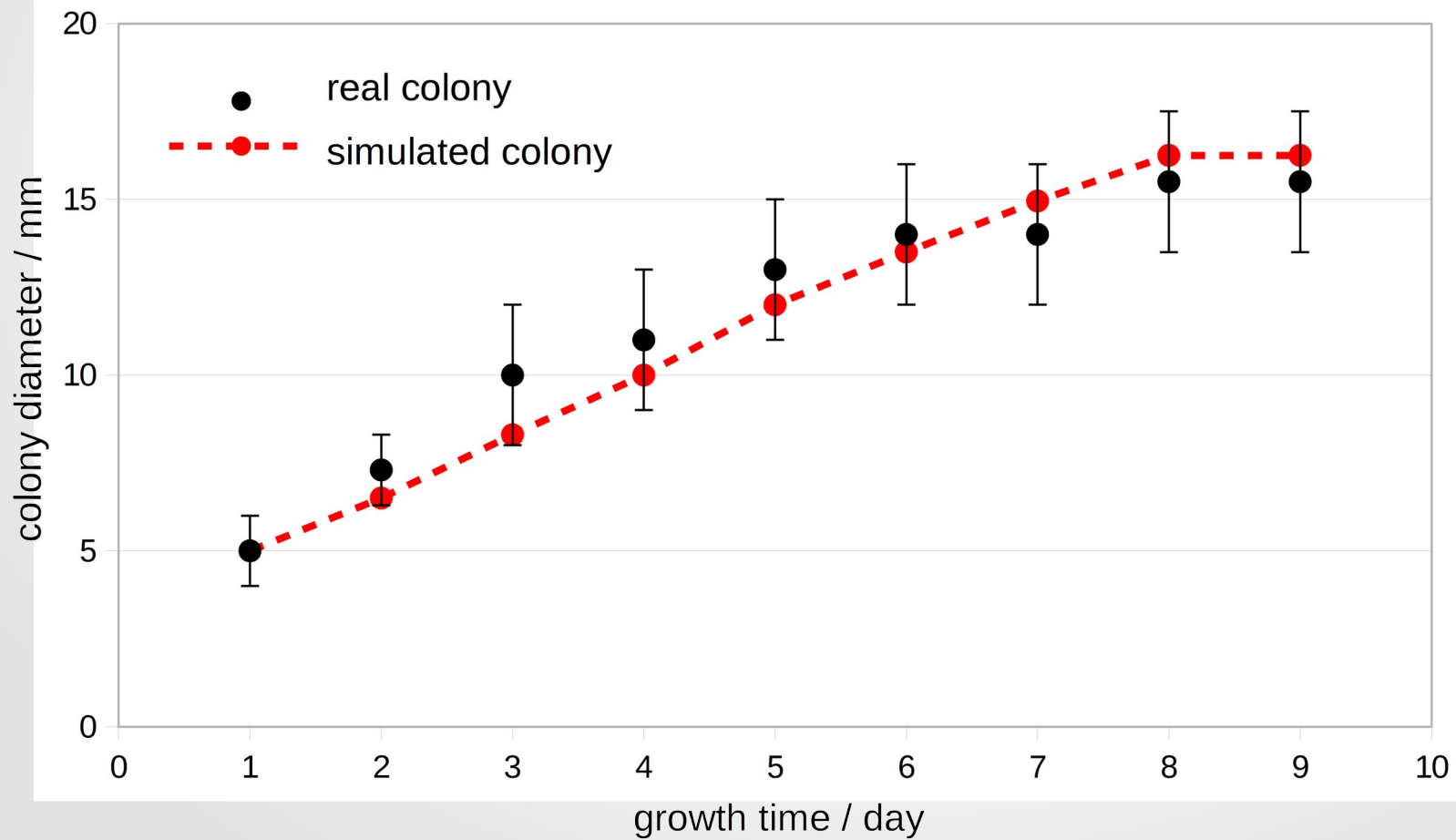
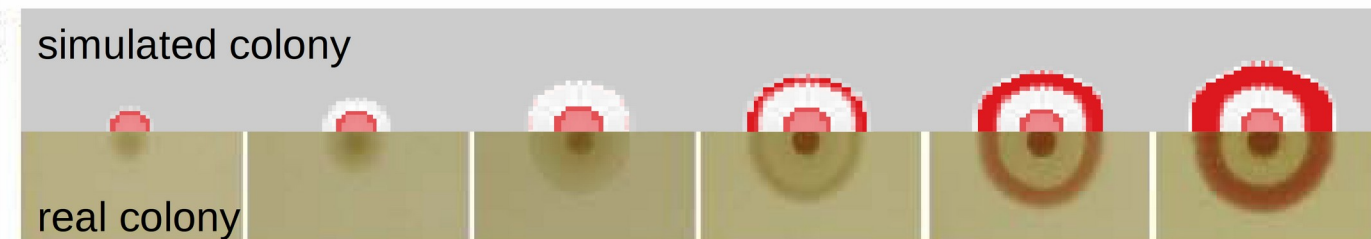
- Reakčne-difúzny model: *Serratia marcescens*



- Reakčne-difúzny model: *Serratia marcescens*



- Reakčne-difúzny model: *Serratia marcescens*



Reakčne-difúzny model: Serathlon 1.0

Exponential growing cultures in **LB**



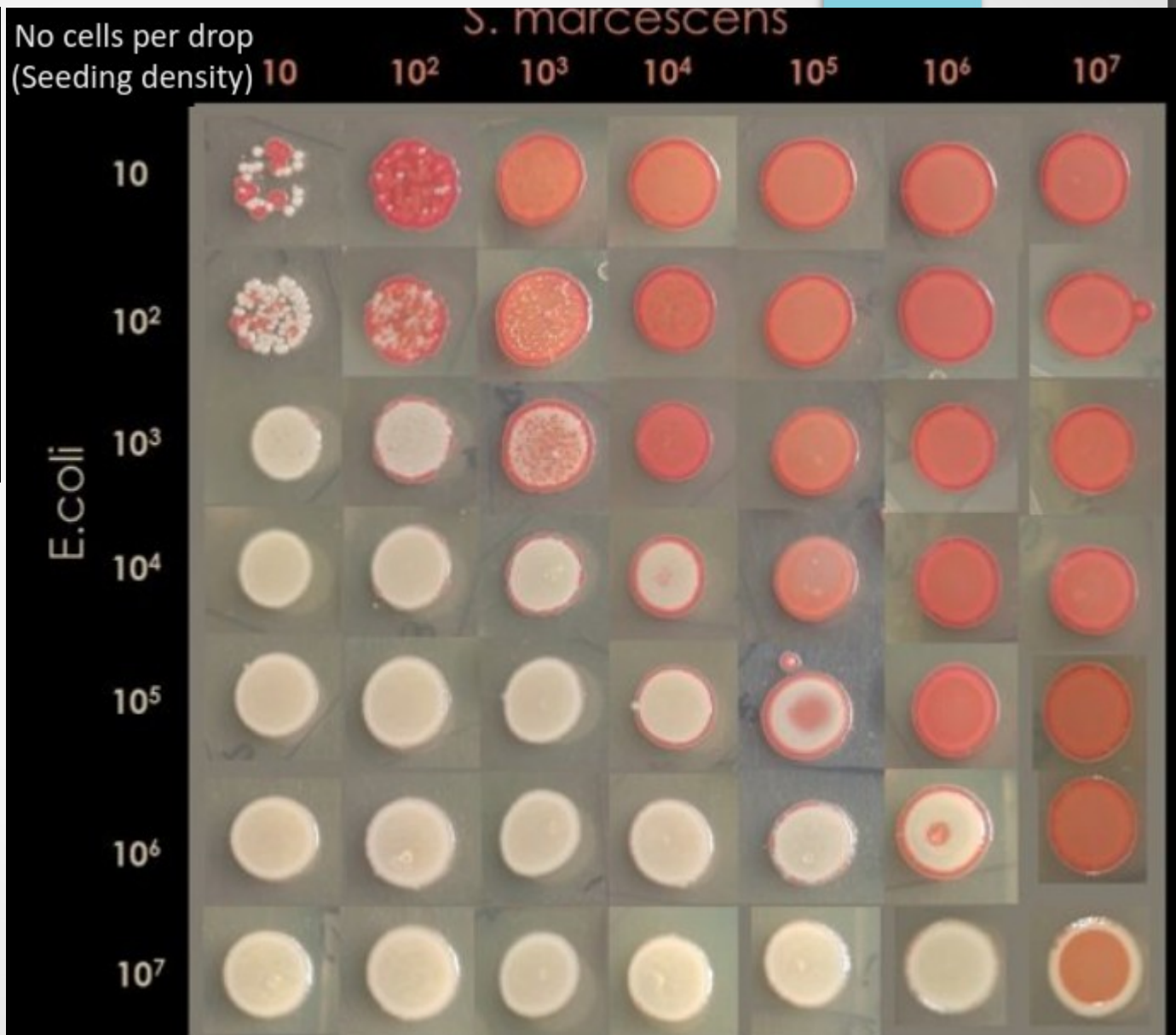
E. coli
100,000 cells

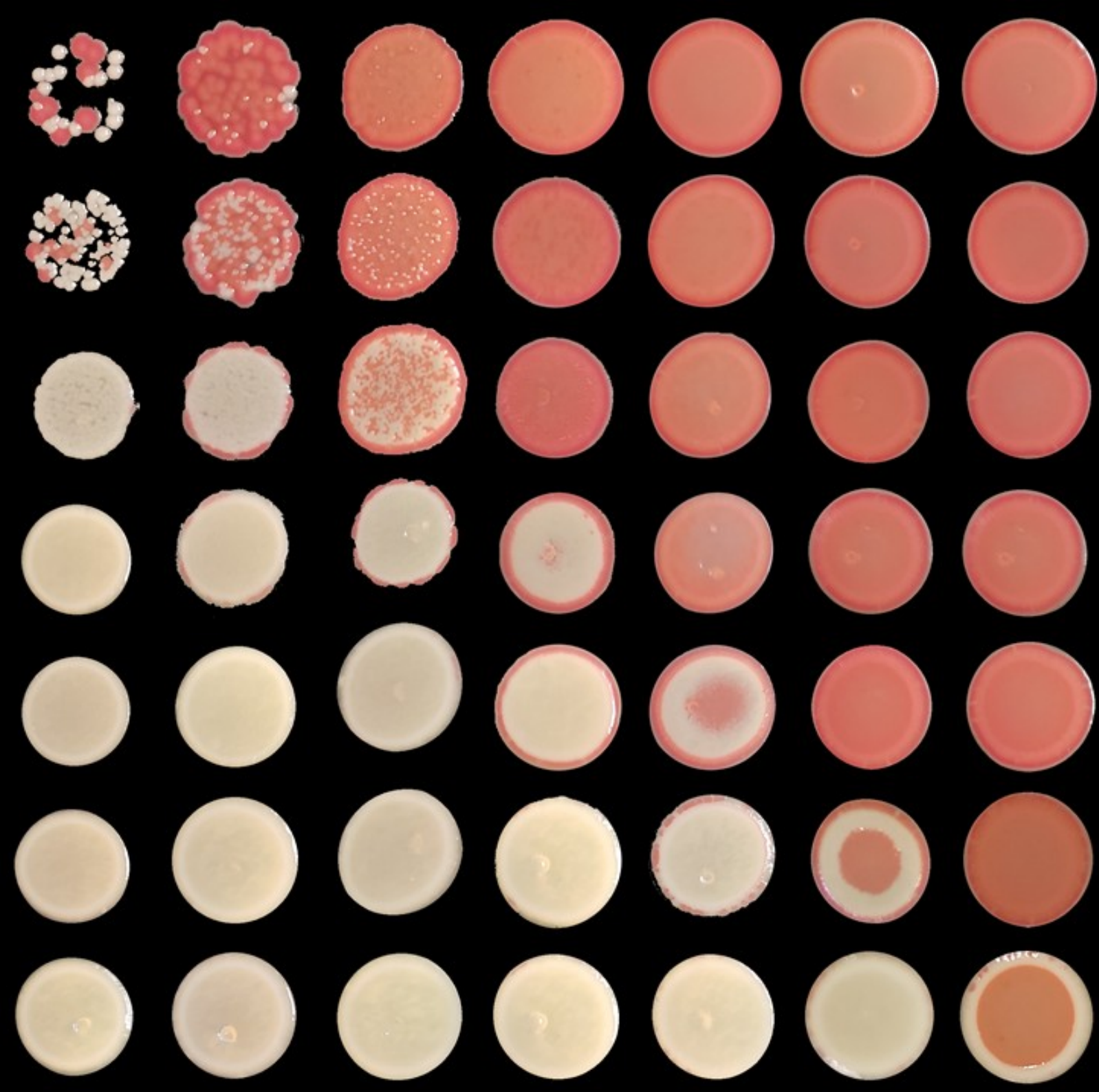


S. marcescens
100,000 cells

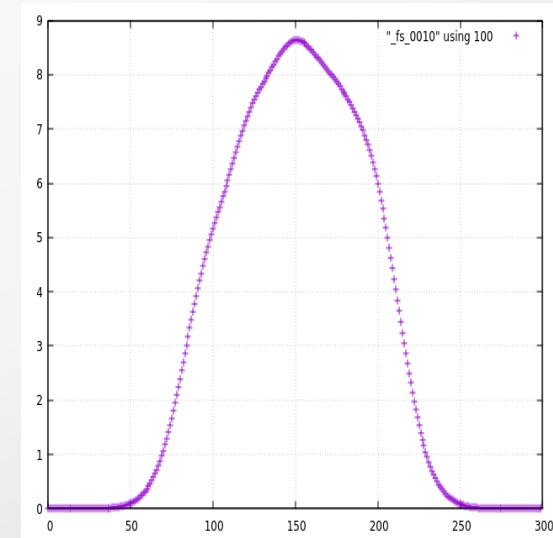
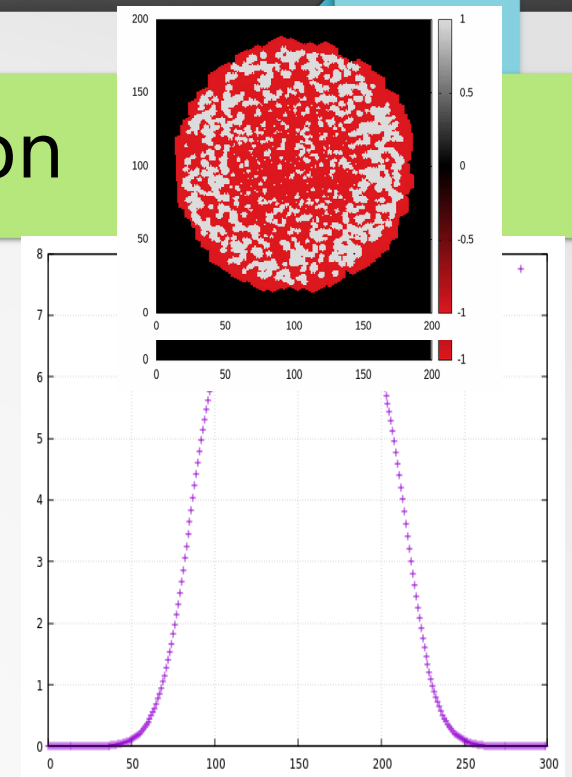
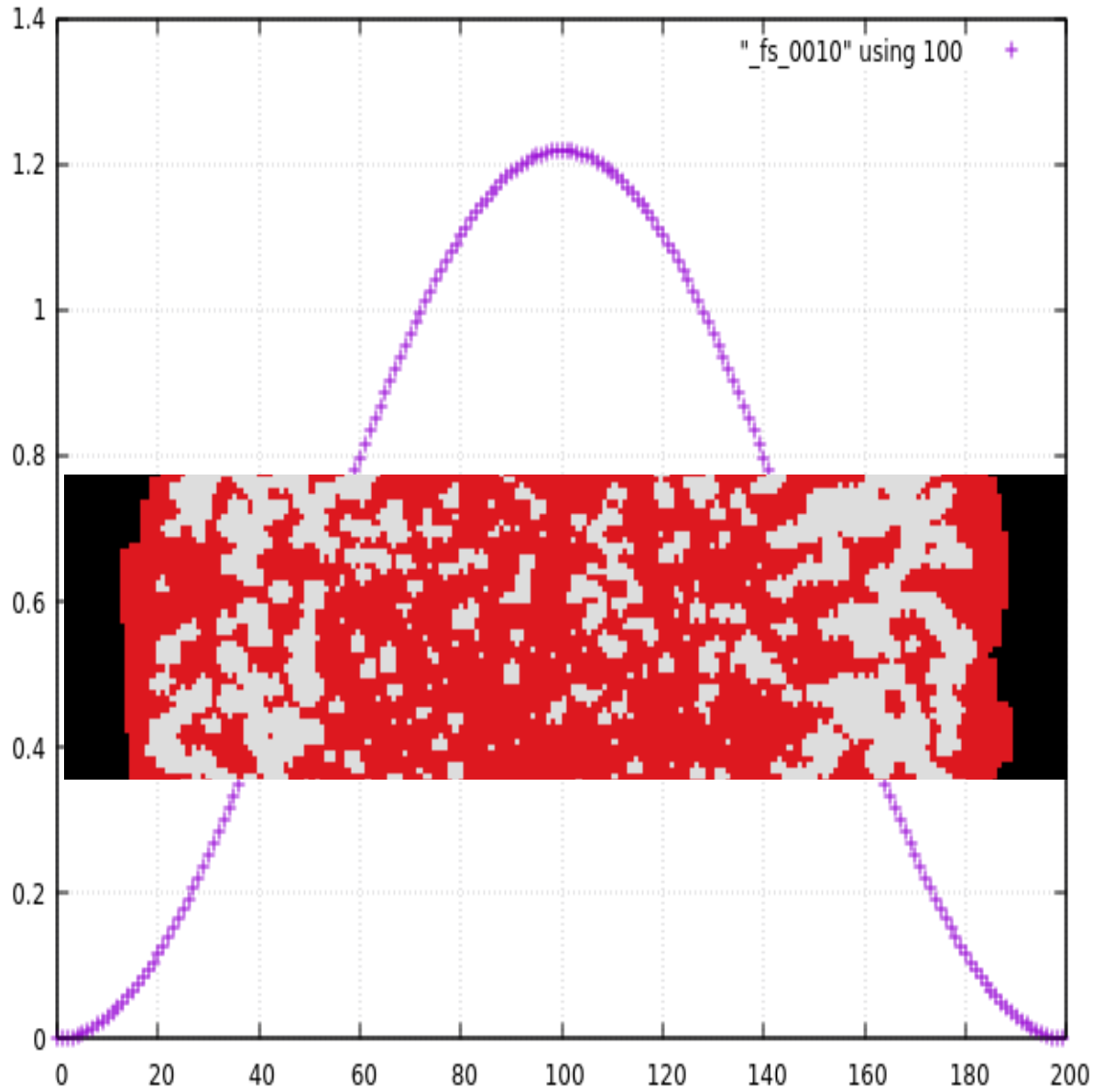


E. coli + S. marcescens

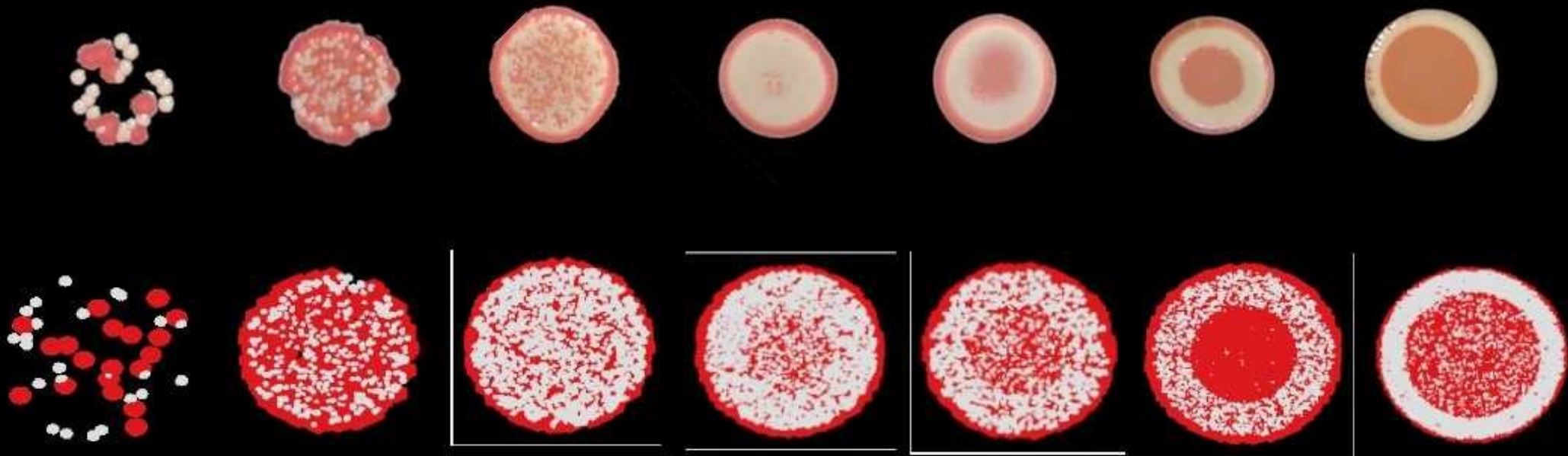


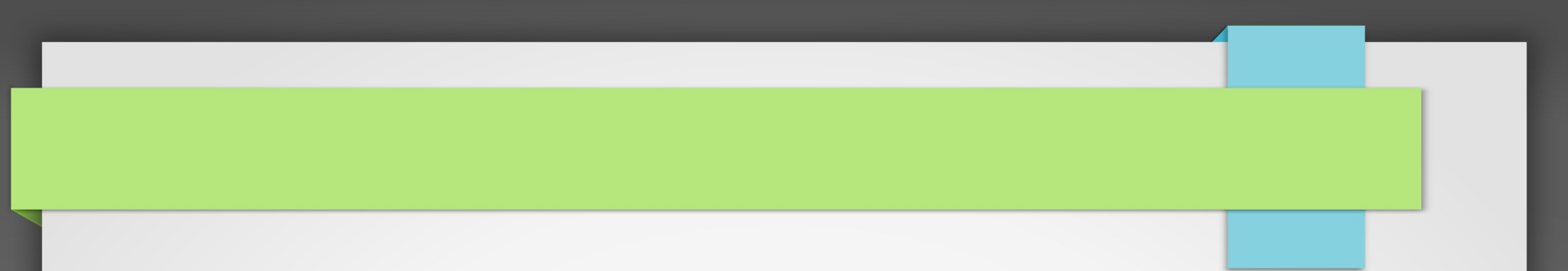


Reakčne-difúzny model: Serathlon



Reakčne-difúzny model: Serathlon 1.0





Ďakujem za pozvanie a za pozornosť