Prey type determines the evolutionary trajectory of a generalist predatory bacterium

Marco La Fortezza*[1], Sophie Scheiwiller[1], Sébastien Wielgoss[1], Severin Frei[1], Yuen-Tsu Nicco Yu[1], and Gregory J. Velicer[2]

[1]ETH Zurich – Suisse
[2]ETH Zurich – Suisse

Résumé

Explaining the emergence of generalist and specialist predators is a major goal in the evolutionary ecology of predation. Yet, it is unclear how different predatory profiles originate and persist. We investigated how evolutionary adaptation to growth on single prey species affected the profile of a generalist bacterial predator. We examined populations of the soil bacterium *Myxococcus xanthus* derived from an evolution experiment that imposed selection for swarming and growth over lawns of prey, either *Escherichia coli* or *Bacillus subtilis*. Examining the predation-associated traits of motility and lethality, we found clear signatures of prey-specific evolution, confirmed also by whole genome sequencing. However, we also detected substantial phenotypic variation among replicate populations, suggesting multiple trajectories by which *M. xanthus* adapted to the same prey. We then tested for indirect effects of prey-specific adaptation on predatory performance on other prey. *M. xanthus* populations adapted to *E. coli* showed limited improvement, whereas populations adapted to *B. subtilis* had enhanced predation on other prey. Finally, from the obtained mutation profiles, we characterised a single gene key to the increased – both specific and generalist – predatory performance observed in populations adapted to *B. subtilis*. Taken together, our results indicate that adaptation to one prey can benefit a generalist predator indirectly on other prey. However, the pattern, the molecular bases, and the degree of such carry-over depend on the prey present during selection.

Mots-Clés: experimental evolution, bacterial predation, predatory adaptation, generalist predator, whole genome sequencing

*Intervenant