Evolving M. xanthus on a fungal wheat pathogen

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Résumé

Myxococcus xanthus is known for its ability to prey on a wide variety of both bacteria and fungi (1). We demonstrated that *M. xanthus* is able to grow on and kill the major wheat pathogen *Zymoseptoria tritici*, the cause of both yield loss and the use of the majority of fungicides in Europe, in an environment mimicking its state between growing seasons where it stays dormant on wheat stubble (2). We next sought to test whether experimental evolution of bacterial predators over relatively short periods can be used to rapidly increase the efficacy of potential biocontrol agents under laboratory conditions intended to partially mimic relevant natural conditions. To do so, we evolved various strains of *M. xanthus* for 40 cycles of growth in flasks containing moist straw on which *Z. tritici* had been grown prior to addition of *M. xanthus*. Based on data collected during the evolution experiment, it does not appear that either very bad or very good ancestral killers improved significantly in their average killing abilities, whereas some ancestrally intermediate killers show slight average improvements. Some individual replicate populations, however, appear to have increased much more in their killing abilities than most populations. Interestingly, ancestrally bad killers, which don't decrease prey population size, survived this serial transfer regime and were able to replenish their population size each cycle. However, control populations provided only with straw and no *Z. tritici* went extinct, indicating that *Z. tritici* can facilitate *M. xanthus* survival without being extensively killed by the predator. Starting with one biological system, our experiment provides new insights into how rapidly, how consistently and how extensively bacterial predators might be experimentally selected for increased effectiveness at biocontrol. It also points to surprising interactions between a targeted pathogen and some strains of this bacterial predator.

Mots-Clés: microbial predation, biocontrol, wheat pathogen

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