Protoplast fusion in *Bacillus* species produces frequent, unbiased, genome-wide homologous recombination to create a diverse library

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Background

- Protoplast fusion is a classical genetic technique that can lead to whole-genome recombination between genetically diverse microorganisms
- This method has been widely adopted as a strategy to generate microorganisms with improved phenotypes for biotechnology applications but knowledge about dynamics of recombination across the chromosome is limited

Approach

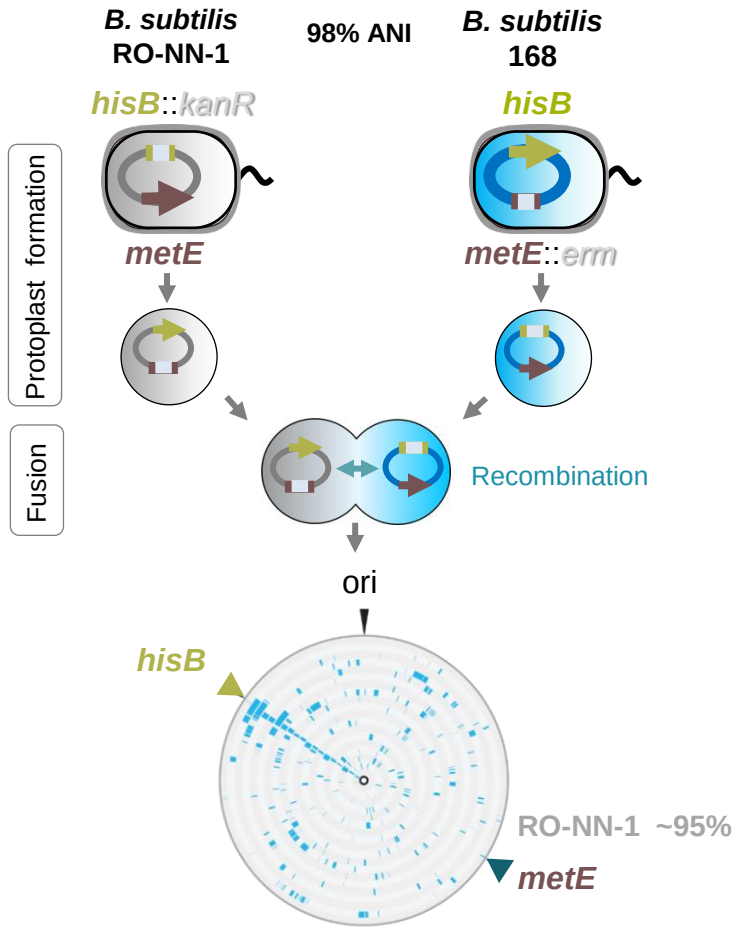
- Genome-wide recombination was characterized using next-generation sequencing in progeny generated by protoplast fusion between *Bacillus* strains with different genetic distance
- The effect of key genomic parameters on recombination was studied using an in-house computational pipeline

Outcome

- Protoplast fusion does generate multiple recombination events across the chromosome
- Recombination is not affected by local genomic parameters and occurs uniformly across the genome
- Interestingly, large species-level genetic distance does not affect significantly genome-wide recombination patterns

Significance

- This study provides new avenues for development of strategies for rapid cell engineering
- It may aid in a better understanding of bacterial evolution in natural systems
- This result supports the use of genome shuffling libraires for improving cellular function and gene validation in bioenergy relevant microbes



Protoplast fusion produced multiple recombination events throughout the chromosome generating global and local fine-scale recombination patterns.

Vasileva D. P. *et al.*, Protoplast fusion in *Bacillus* species produces frequent, unbiased, genome-wide homologous recombination, *Nucleic Acids Research*, DOI: 10.1093/nar/gkac025

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