

Science 319, 1533 (2008);

DOI: 10.1126/science.1153498

Direct Visualization of Horizontal Gene Transfer

Ana Babić,1,2* Ariel B. Lindner,1,2 Marin Vulić,1,2† Eric J. Stewart,1,2†
Miroslav Radman1,2,3‡

Abstract: Conjugation allows bacteria to acquire genes for antibiotic resistance, novel virulence attributes, and alternative metabolic pathways. Using a fluorescent protein fusion, SeqA-YFP, we have visualized this process in real time and in single cells of *Escherichia coli*. We found that the F pilus mediates DNA transfer at considerable cell-to-cell distances. Integration of transferred DNA by recombination occurred in up to 96% of recipients; in the remaining cells, the transferred DNA was fully degraded by the RecBCD helicase/nuclease. The acquired integrated DNA was tracked through successive replication rounds and was found to occasionally split and segregate with different chromosomes, leading to the inheritance of different gene clusters within the cell lineage.

可视化基因水平转移

细菌可以通过接合作用获得耐抗生素基因、新的毒力特性以及其它的代谢旁路途径。通过我们构建的免疫蛋白融合物SeqA-YFP，我们可以在大肠埃希菌中将接合的过程在实时水平和单个细胞水平上达到可视化。我们发现在细胞到细胞的距离上F菌毛可以调节DNA的转移。转移的DNA在受体菌中通过重组而整合到基因组中的几率达到了96%，在剩下的4%的细胞中，转移的DNA被RecBCD解螺旋酶或者核酸酶完全降解。通过跟踪连续的复制循环过程，发现整合后的DNA偶尔断裂并且分裂到不同的基因组中，从而导致在细胞谱系中不同的基因簇引起了不同的遗传特性。

陈浩

2008-4-22