Super Bac 1 - An Inducible Vector With Shuttle Capability

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The Wisconsin Alumni Research Foundation (WARF) is seeking commercial partners interested in developing an improved BAC vector, called Super BAC 1, for use in genomic studies.

Overview

Because they retain large DNA inserts over many generations, bacterial artificial chromosomes (BACs) are popular vectors for genetic and expression analyses of genomic DNA libraries; however, their use poses some limitations. BACs exist in low copy number in cells, making isolation of sufficient DNA for later analyses difficult. In addition, expression of certain genes from the BAC insert may be inhibited by the biochemical milieu of *E. coli,* the host typically used in expression studies.

The Invention

UW-Madison researchers have now engineered an improved BAC vector, called Super BAC 1, for use in genomic studies. They have modified a widely used BAC to include an *oriV* gene from the IncP plasmid RK2. In the presence of a specific transcription factor, *oriV* provides arabinose-inducible replication, allowing a 50 to 150-fold amplification of BAC copy number upon addition of arabinose. As a second modification, they have added the *oriT* gene, also from plasmid RK2, to the BAC. This gene confers on *E. coli* the capacity for conjugal mating into *Bacillus* when the *tra* gene is also supplied in trans. To maintain the transferred BAC in *Bacillus*, the researchers have included the *rep60* gene from a *Bacillus* plasmid. This *Bacillus*-specific origin of replication maintains the plasmid at five to six copies per cell in this alternate host.

Applications

- Genetic and expression analyses of genomic DNA libraries

Key Benefits

- Super BAC 1 not only stably maintains large genomic fragments in low copy number, but also provides 50 to 150-fold amplification of inserts upon induction with arabinose.
- Alleviates difficulties associated with isolating low copy number BACs for sequencing, sub-cloning and other manipulations
- In expression studies, amplifiable BAC may allow discovery of novel chemicals and activities that would go undetected with a low copy number BAC.
- Shuttle capability into *Bacillus* overcomes the low transformation efficiencies typically seen with Gram-positive species.
- Shuttle capability should allow identification of novel phenotypes not observed in *E. coli*.

Additional Information

For More Information About the Inventors

- Jo Handelsman

Related Technologies

- Use of this biological material requires a license to the WARF technology "Conditionally Amplifiable BAC Vectors."

Tech Fields

- Research Tools : DNA & RNA tools
- Research Tools : Genomics & proteomics

For current licensing status, please contact Jennifer Gottwald at jennifer@warf.org or 608-960-9854