Contact-dependent signaling in bacteria

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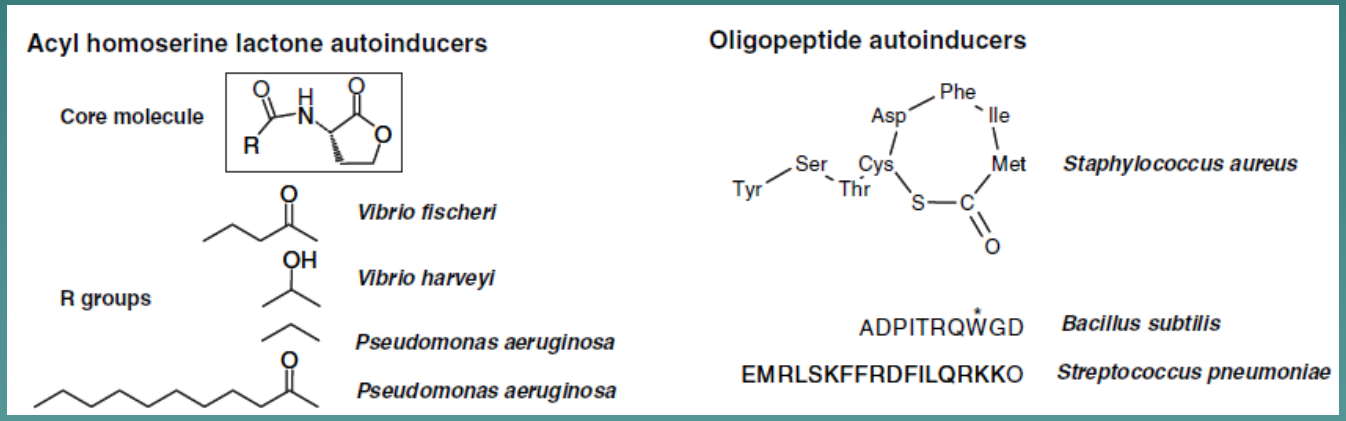
Intercellular communication in bacteria

- Quorum-sensing (QS) signals: AHLs, Oligopeptides, AI-2



- **Physical contact**

Science 2006 ;311: 1113-1116

Contact-dependent signaling

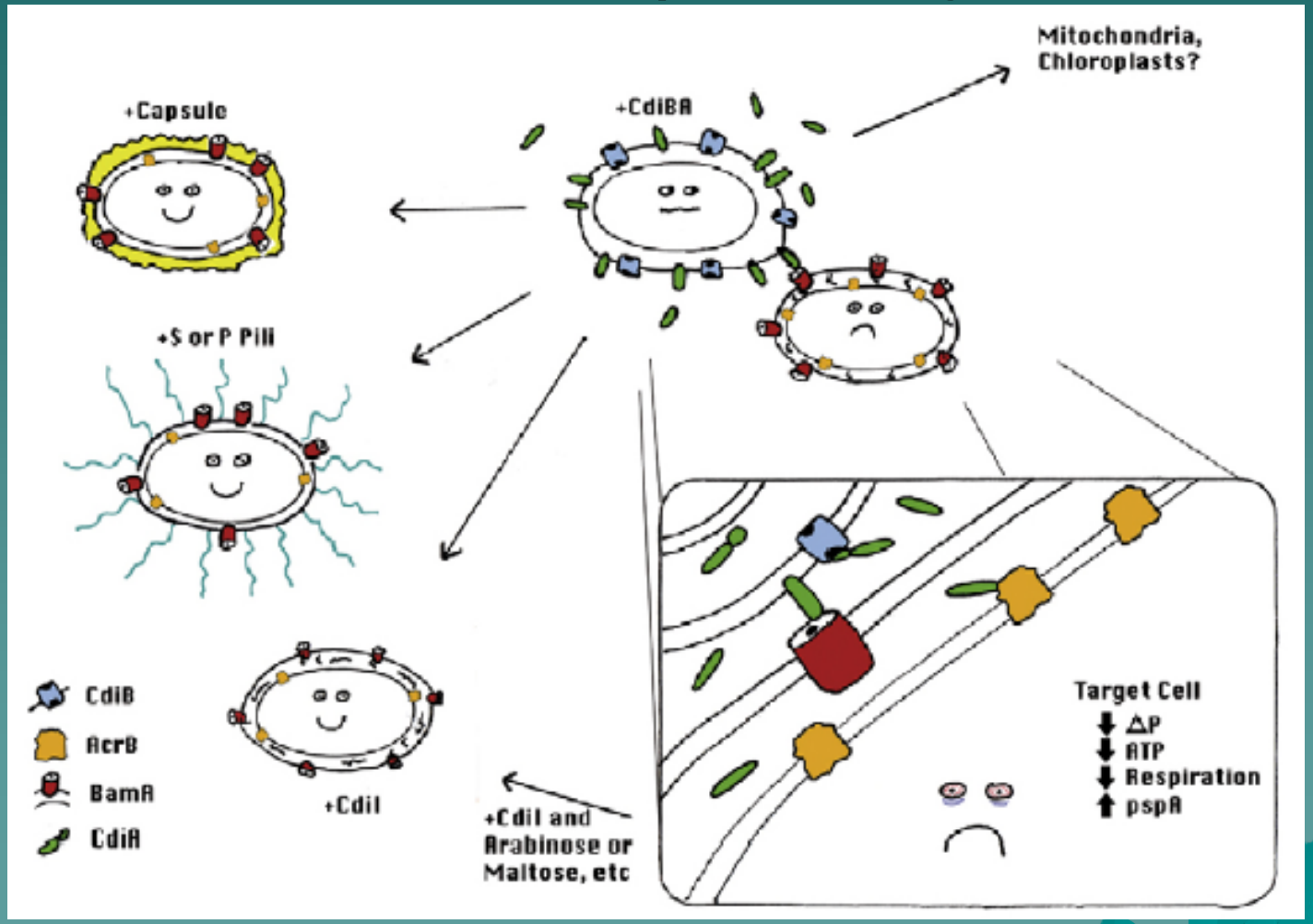
- Physical contact
- i) Direct
- ii) Short range
- iii) Specific
- ➔ “Privacy”

Examples

- *Myxococcus* C-signaling
- *B. subtilis* sporulation
- *Geobacter* biofilm formation
- **Contact-dependent inhibition (CDI) in *E. coli***

E. coli CDI systems

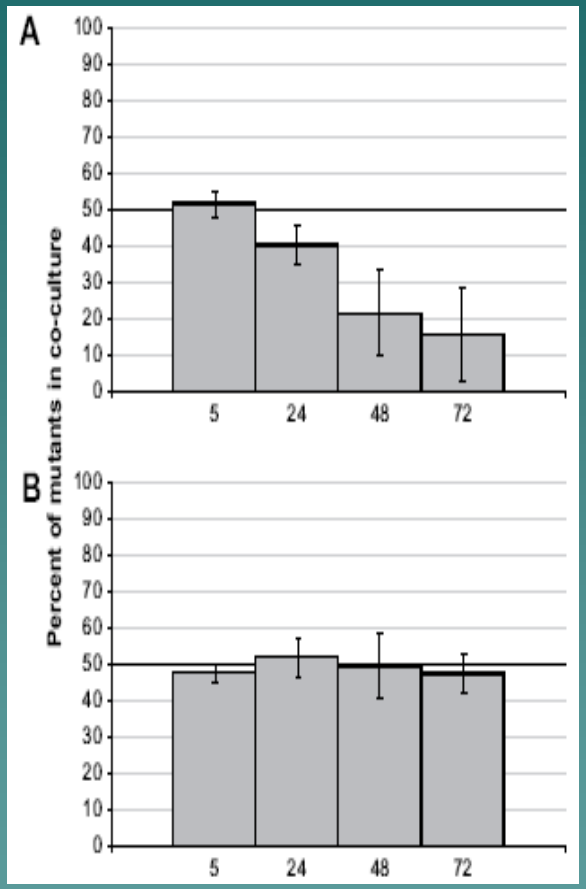
- i) *cdi*BA-mediated pathway

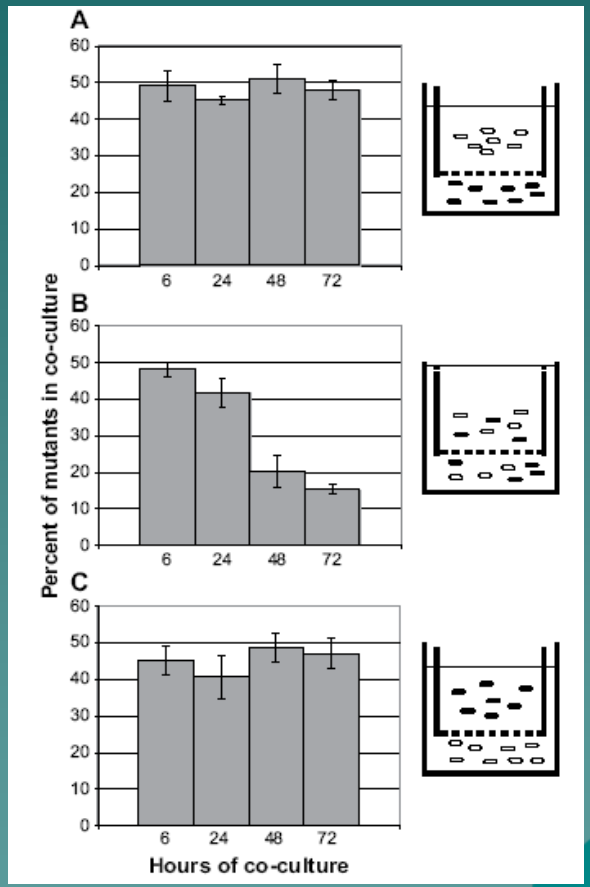


Curr Opin Microbiol. 2009;12(2):177-81

E. coli CDI systems

- ii) *uup*-dependent immunity
- Absence of *uup* gene led to susceptibility to parents
- Encodes ABC-like ATPase
- Occurs at late stationary phase
- Requires ATP hydrolysis

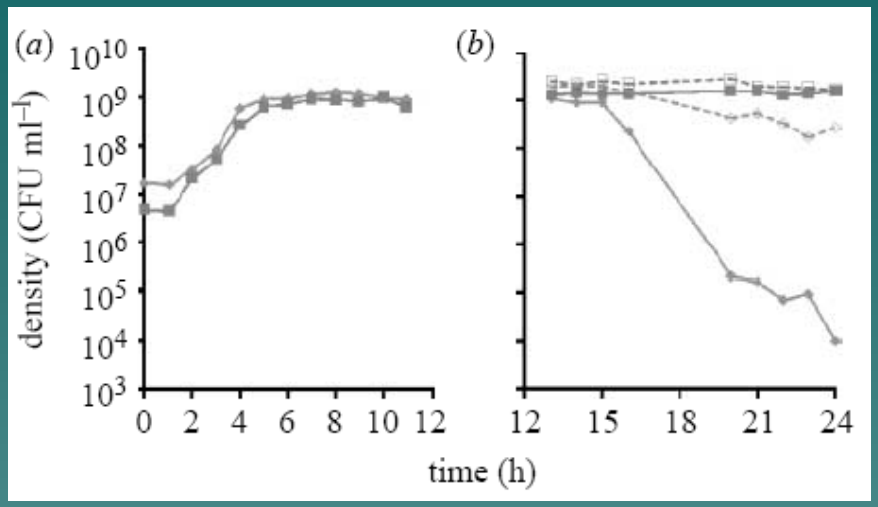


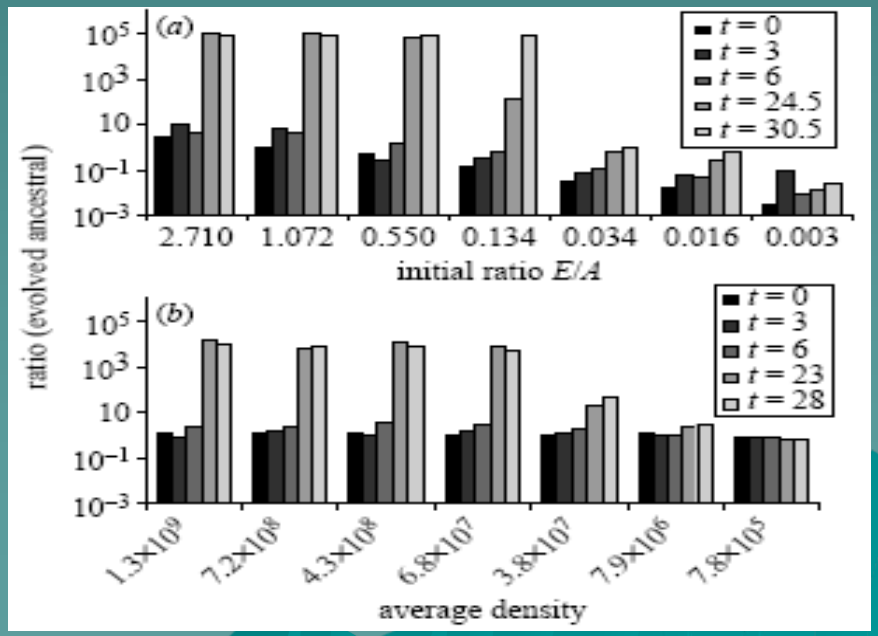


Res Microbiol. 2008 ;159(9-10):671-7.

E. coli CDI systems

- iii) Stationary phase contact-dependent inhibition (SCDI)
- *glgC* mutants from serial passages
- Mutant cells inhibits parental cells
- Hyperglycogenic
- Occurs at stationary phase





Proc. R. Soc. B 2008 ;275: 3-10

Summary

	*cdi*AB-dependent	*uup*-dependent	*glg*C-dependent
Strain	MC93	K-12	K-12
Allele acquisition	unknown	Artificial gene deletion	mutants from serial passage
Signaling condition	Exponential	Late stationary	Late stationary
Contact-dependent effects	Reversible growth and metabolic inhibition	growth inhibition/killing	growth inhibition/killing
Mechanism	unknown	unknown	unknown
Other phenotypic traits	unknown	Increased rate of gene deletion	Hyperglycogenic

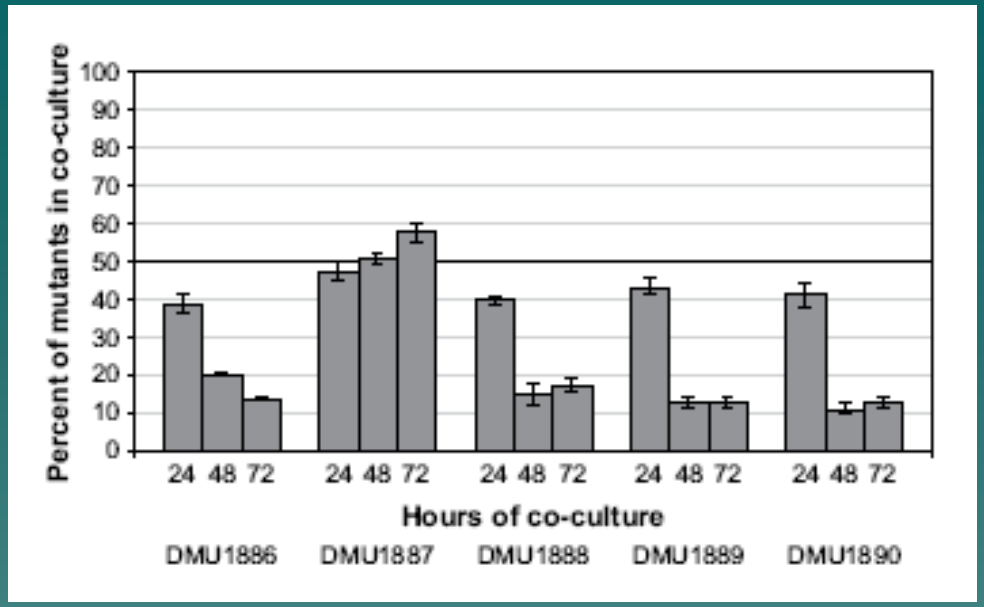
Discussion

- Further questions:
- - Signaling mechanisms
- - Downstream targets
- - Relationships between systems
- - Physiological importance

Discussion

- Physiological significance
- - Invasion/defense (e.g. *cdi*BA)
- - Long-term survival (e.g. *glg*C)
- - Enables gross (QS) and fine (CD) coordination within population
- Clinical significance
- - Antimicrobial treatments
- Biotechnology
- - Yield improvement

~End~



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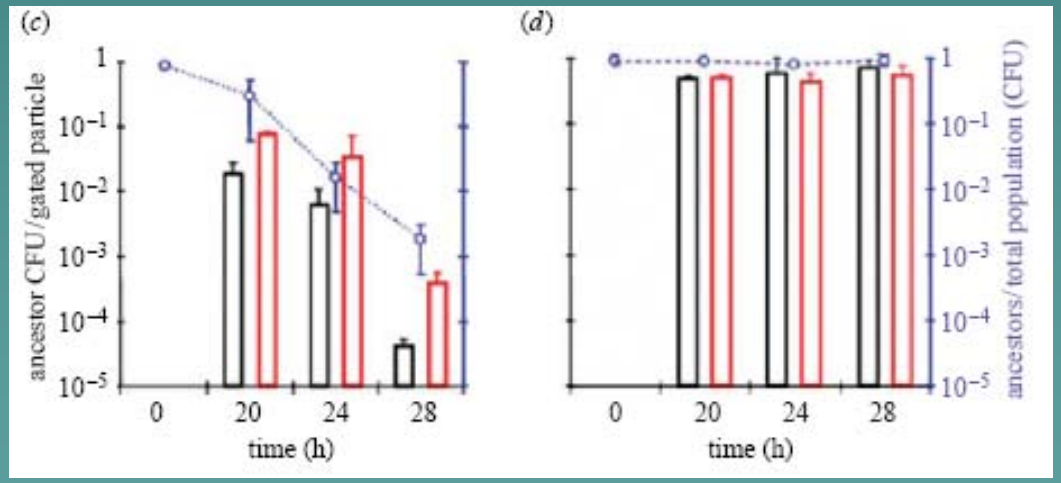

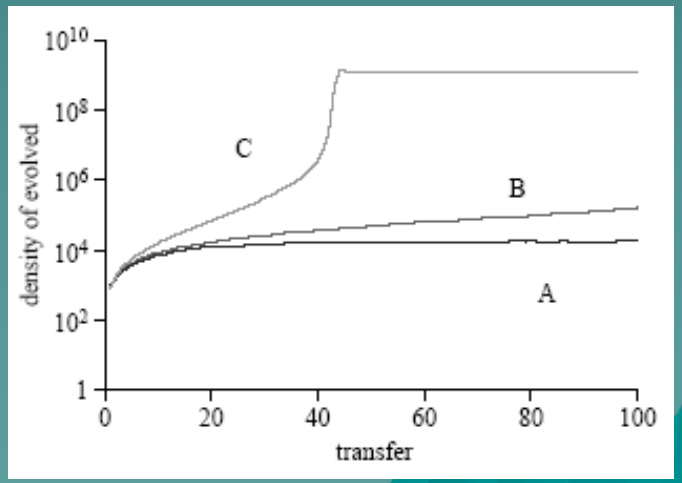

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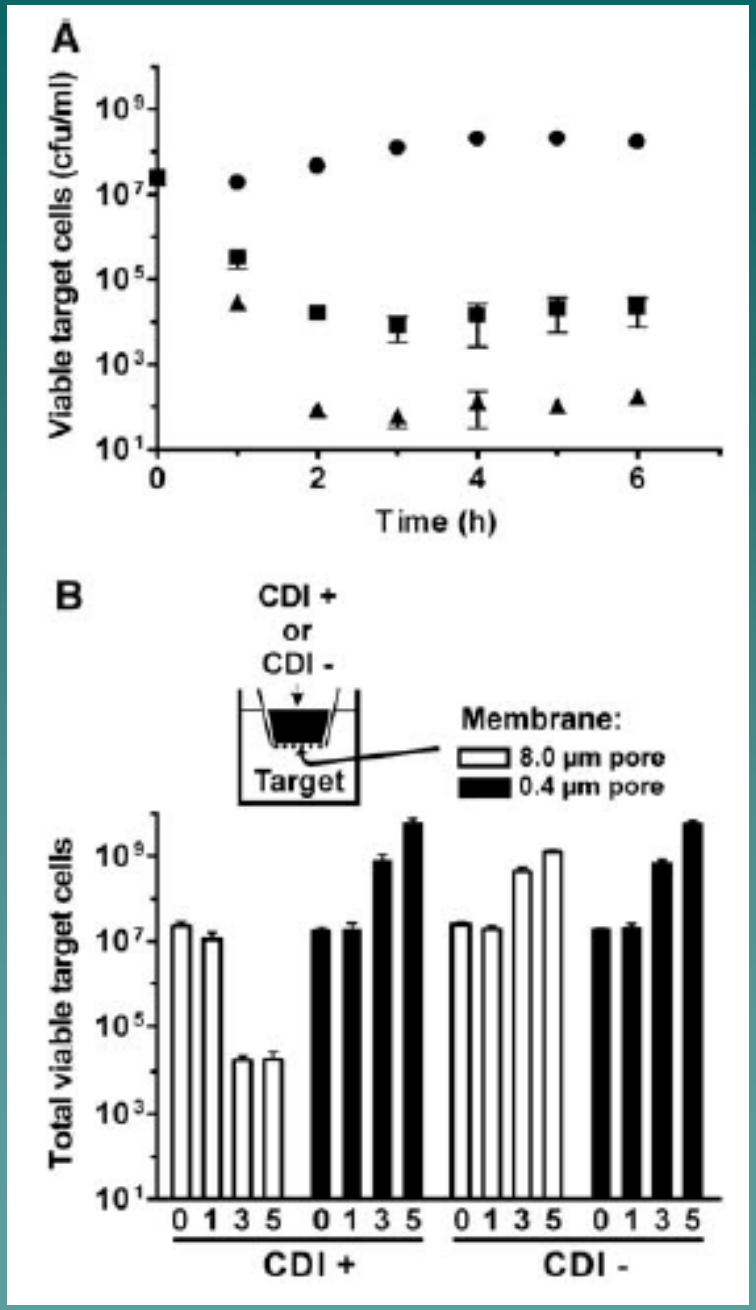
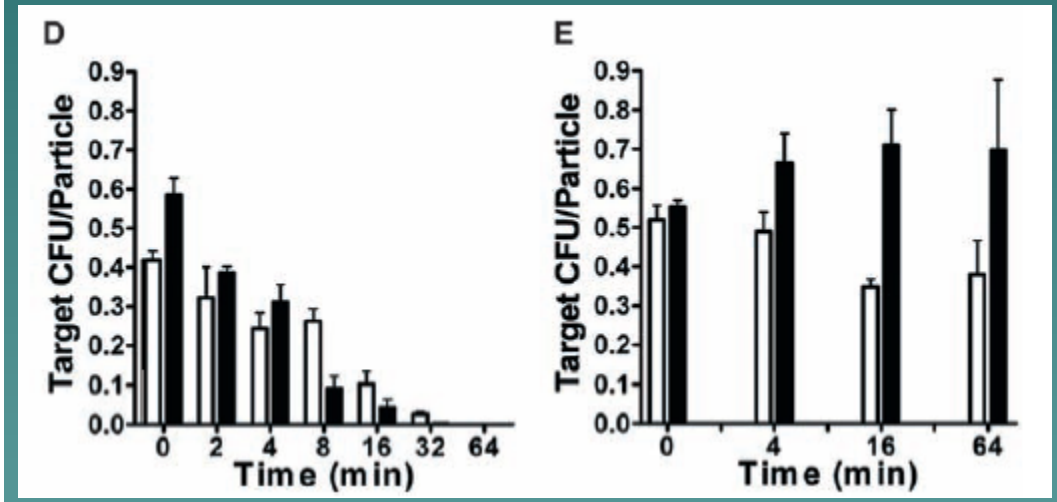
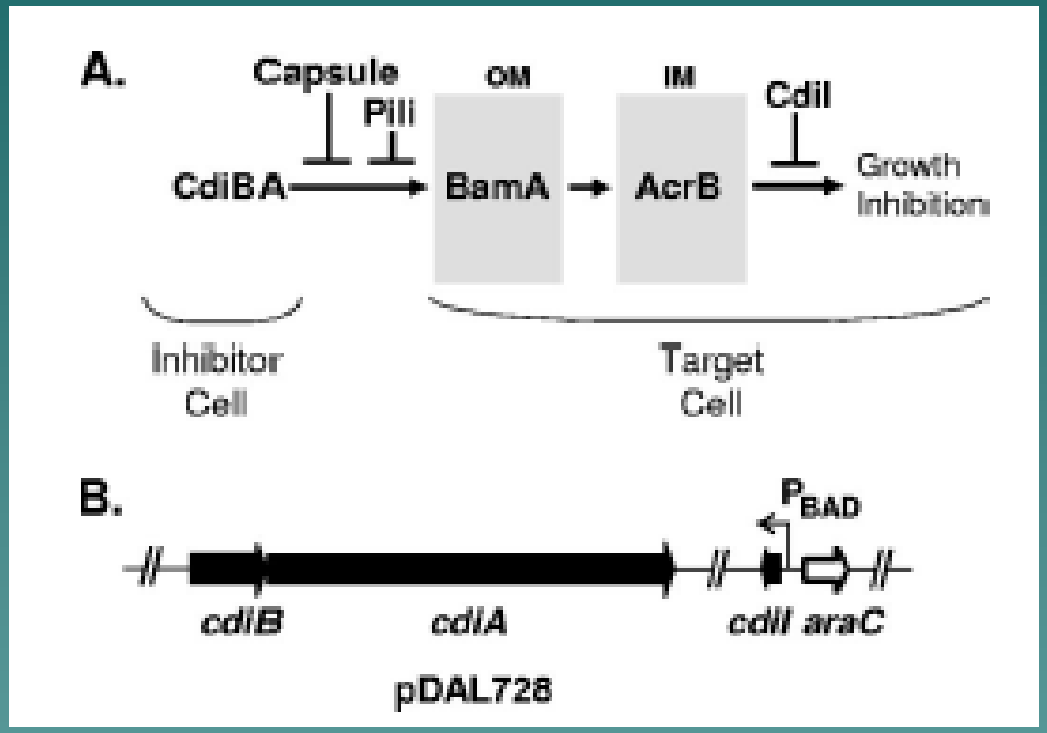




Science 2005 ;309: 1245-1248



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