Chromatin and Gene Expression in E. coli

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Pathumthani, Thailand
9 March, 2005
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Outline

• Gene Expression
• Bacterial chromatin
Part the first:

Introduction

• Regulation of Gene Expression in Bacteria
log(P-value) (Peter et al.)

-0.00

Correlation (Peter et al.)

-0.70

WT in LB (Jeong et al.)

0.00

WT in M9 (Jeong et al.)

0.00

WT+Norfloxacine (Jeong et al.)

0.00

GyrAD82G (Jeong et al.)

0.00

Annotations:

- CDS +
- CDS -
- rRNA
- tRNA

Position Preference

dev

avg

Percent AT

dev

avg

Resolution: 1856

1. What is Regulated?

2. How is it Regulated?
Three levels of Regulation

1. **Global - chromatin**  
   ~100,000 proteins/cell

2. **Sigma factors**  
   ~1,000 proteins/cell

3. **Transcription factors**  
   10 to 100 proteins/cell
1. Global - chromatin
2. Sigma factors
Actinobacteria

Firmicutes

Proteobacteria
sigE
sporulation
initiation

RpoS

RpoD

sigF
sporulation

sigG
sporulation

Chlamydia
Cyanobact.
Firmicutes
“other phyla”

Actinobacteria

RpoH

flagella

RpoF

σ70

RpoD

RpoS

RpoH

σ70

RpoF

Part the last:

- Chromatin proteins in bacteria
- Gene Expression in bacteria
Curved DNA

torroidal supercoiling

topological boundary

plectonemtic supercoils

RNA polymerase

Genomic landscape of *E. coli* kindly provided by Josh Stuart, Stanford; *Science*, 293:2087-2092 (2001).
Summary

1. There are three levels of regulation:
   - global (chromatin)
   - broad groups (sigmas)
   - specific sets of genes (transcription factors)

2. DNA compacted ~10,000x in most organisms.

3. Where you are in the chromosome is important!