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## The Regulation of Chromatin Structure

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- Epigenetic inheritance
  - Protein structure (cell memory)
- Non histone proteins
- Evolutionary change in core histones
  - Mammal vs. pea
- Silenced genes

3 

- Interphase
  - Heterochromatin
    - Centromeres
    - Telomeres
    - Other regions
  - Euchromatin
    - Position effects
      - Variegation
    - >50 genes
      - Require precise core histone sequences

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- Histone modifications
  - Acetylation
    - Lysine (K)
  - Methylation
    - Lysine & arginine (R)
  - Phosphorylation
    - Serine (S)
- Function
  - Change affinity of tails for nucleosomes
  - Attract specific proteins (gene expression)
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## The Global Structure of Chromosomes

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- 30nm fiber loops & coils into higher order structure

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- Polyploid insects
  - *Drosophila* salivary gland

8  – Banding pattern - chromosome map

9  • Determined by associated proteins

10  • Chromosome puffs

11  • Chromosome zones  
• Active genes extend beyond zones

12  • Nucleolus  
• Other specialized regions present  
– Subnuclear organelles

13  • Disentangles sisters  
• Protects fragile DNA

14  How Genomes Evolve  
245-260

15  • Duplication & divergence  
• Changes  
– 1 nucleotide/1000 every million years  
• Errors  
– Replication  
– Recombination  
– repair  
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16  • Accumulated mutations  
• Purifying selection

• Molecular clock  
– Rate depends on sequence used

17 18 

- Coding regions (exons) conserved sequence

19 

- Multispecies conserved sequences

20 21 

- Genetic drift
- Founder effects

- Single-nucleotide polymorphisms (SNPs)
  - Differences expected in human populations
- Polymorphic
  - Individuals will differ at a site
  - Relate to phenotypes
- CA repeats
  - DNA fingerprinting