Review 15

Hereditary Factors:  
- Where are they? IN NUCLEUS OF CELL  
- What are they? PROTEIN OR NUCLEIC ACID? 
- How do they work?  
- How do they get passed on?

**WHAT IS THE COMPOSITION OF THE HEREDITARY FACTORS?**

the material of the hereditary factors must be

- exactly reproducible  
- reliably stable  
- capable of carrying complex information

Can't be small molecules or ions

**Protein or Nucleic Acid?**

* Proteins favored because:
  - Known to be very important to cells; not much known about nucleic acids or their structure
  - Complexity argument (example of four amino acids versus four nucleic acids—160,000 different combinations versus 256 combinations) favored proteins over nucleic acids

* How does one decide whether proteins or nucleic acids are the hereditary material?

* Accumulating evidence in favor of nucleic acids:
  1) 1928 F.W. Griffith--experiments with *Streptococcus*, bacterium that causes a particularly virulent form of pneumonia
     - Found presence of a "transforming factor" which transforms non-virulent bacteria into virulent bacteria
  2) 1943 O.T. Avery
     - Identified transforming factor as DNA
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3) 1952 Hershey and Chase—experiments with radioactively labeled BACTERIOPHAGE (bacterial virus)
   — showed that it was DNA that entered the bacterial cells, not protein

4) 1953 Watson and Crick identify the double helical structure of the DNA molecule
   — it’s the DNA that carries the hereditary information!

Nucleic Acids

DNA and RNA—know them & differences between them!
Nucleotides and nucleotide triphosphates (e.g. ATP)
Structure of nucleic acids
   bases sticking “free” off the sugars