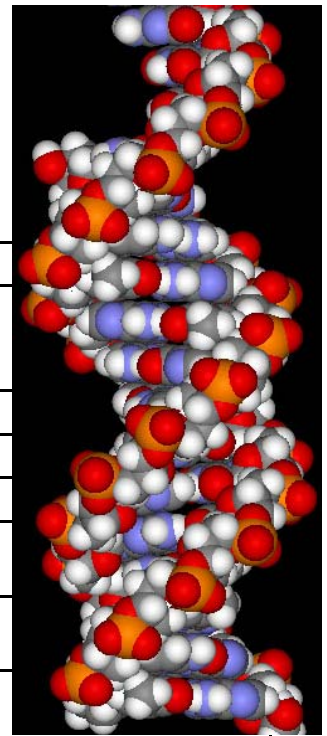


DISCOVERY AND PROPERTIES OF DNA

revised 25 July 2016
p. 352-370, 393-408, Campbell: pp 278-291, Campbell 6th: 287-292, 7th: 293-298, 9th: 305-322, 10th: 312-

Genetic material must satisfy two functions: 1) **carrier of information** (genotype) (LEARN)
2) **be a template for easy replication**



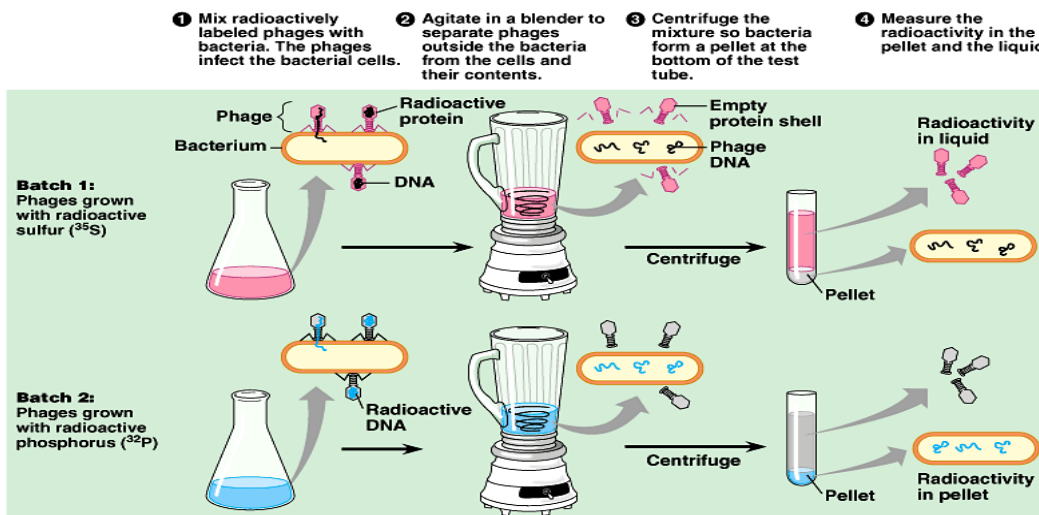
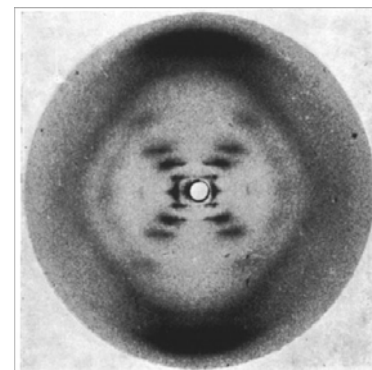
C. Nageli	1842	first observed chromosomes
Friedrich Miescher	1869	isolated "nuclein" from human pus and salmon sperm. (WBC nuclei). Treat with alkali, prepare extract (75 yrs ahead of time)
Walther Flemming	1870s	observed "threads" in dividing cells, termed process mitosis .
Wilhelm Roux	1883	suggested that chromosomes might carry genetic information
W. Waldeyer	1888	Named them chromosomes ("colored bodies")
Correns, von Tschermak, & de Vries	1900	simultaneously rediscovered Mendel's work.
Walter Sutton	1903	proposed chromosome theory of heredity . Linked Flemming's threads with Mendel's factors.
Robert Feulgen	1914	dev. stain for DNA. Staining showed DNA to be a component of chromosomes. Most thought DNA could not be genetic material: composed of only four bases .
Thomas Hunt Morgan	1910-1920	Used <i>Drosophila</i> chromosome morphology to show Sutton correct.
Fredrick Griffith	1928	Used heat-killed Smooth strain Strep, demonstrated transformation of Rough (p. 313)

WHICH IS THE GENETIC MATERIAL: PROTEIN OR DNA?

Chromosomes contain both protein and DNA. Protein is much more complex than DNA (20 subunits vs 3), seemed more likely. Genetic material **MUST**: (again) 1) **encode information**, 2) **be easily replicable**.

Avery, MacLeod and McCarty	1944	Tested the ability of <i>Pneumococcus</i> to be transformed: 1) Fractionated cells: polysaccharides, lipids, RNA, protein, and DNA: only DNA transformed 2) treated extracts with protease or DNAase. Only DNAase destroyed transforming property. Showed DNA was the transforming material.
Chargaff	1947	Chargaff's Rule: molar ratios A/T = G/C and is the same for given species (all members), but varied between species. <i>I.e.</i> , always: A = T and G = C. (P 315)
Hershey and Chase	1952	Labeled T2 phage into <i>E coli</i> : 80% ³⁵ S outside, 65% ³² P inside phage. Therefore phage inject DNA, not protein during infection. (p. 314)
Rosalind Franklin	1952-1953	crystalized DNA, made X-ray diffraction images: a double helix, bases stacked.
James Watson, Francis Crick	1953	Elucidated the structure of DNA., polarity, antiparallel (p. 318). Watson used Franklin's data without her knowledge...

Franklin's Xray diffraction image:



(b) The experiment showed that T2 proteins remain outside the host cell during infection, while T2 DNA enters the cell.