

Nucleic Acids



**Russian State Agrarian University – Moscow Agricultural Academy
named after K.A. Timiryazev**

Frederick Griffith

- **British physician, pathologist, bacteriologist**
 - **Known for discovery of pneumococcal transformation**
-



Griffith's experiment



Died

Mouse with virulent pneumonia

Mouse with heated virulent pneumonia and non-virulent pneumonia mixed together



Lived

Mouse with non-virulent pneumonia

Mouse with heated, killed virulent pneumonia

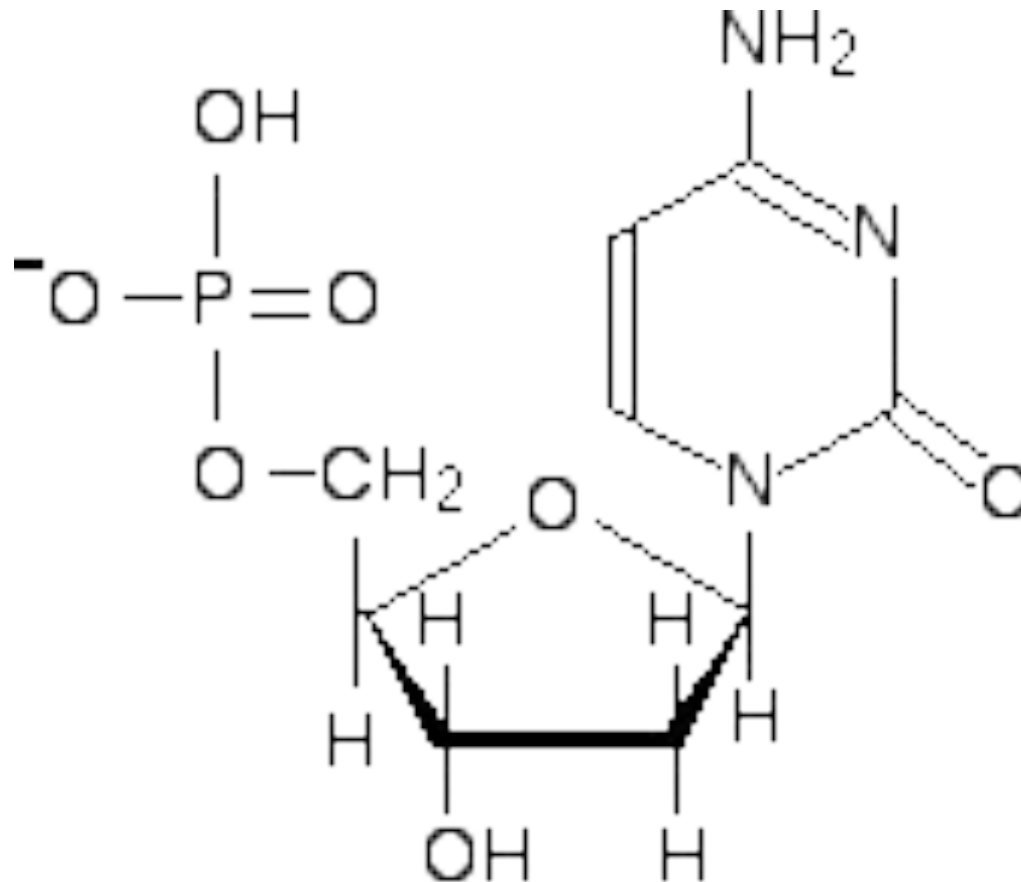
Oswald Avery



Canadian-born American [physician](#) and [medical](#) and medical [researcher](#).

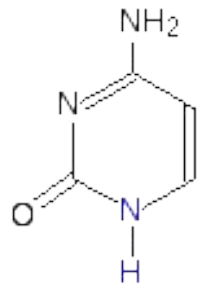
The major part of his career was spent at the [Rockefeller University Hospital](#) in New York City

dCMP

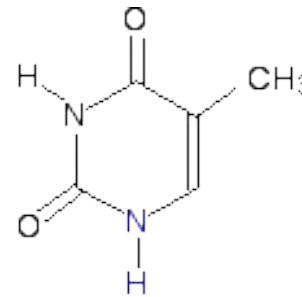


The principal bases in DNA

PYRIMIDINES

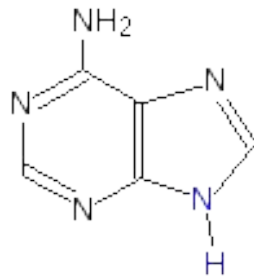


cytosine (C)

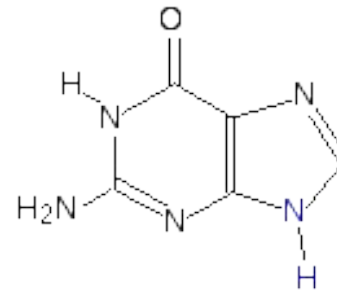


thymine (T)

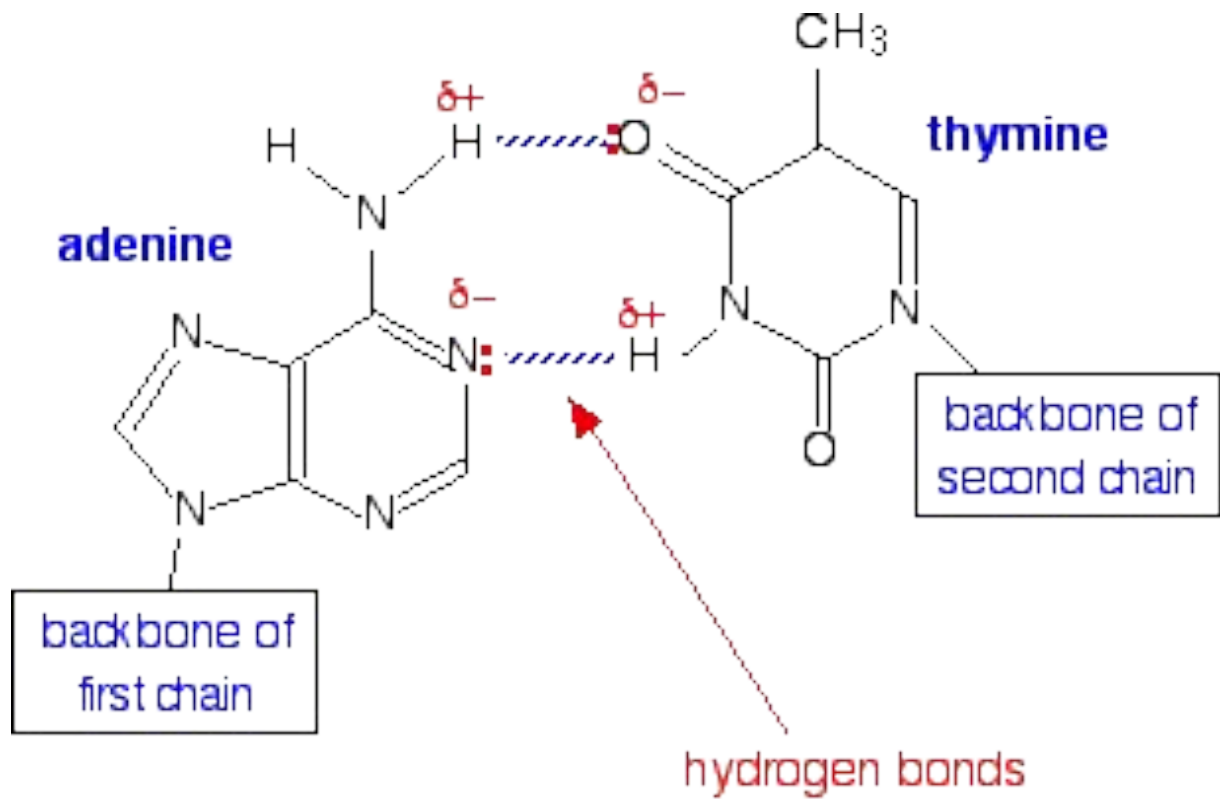
PURINES

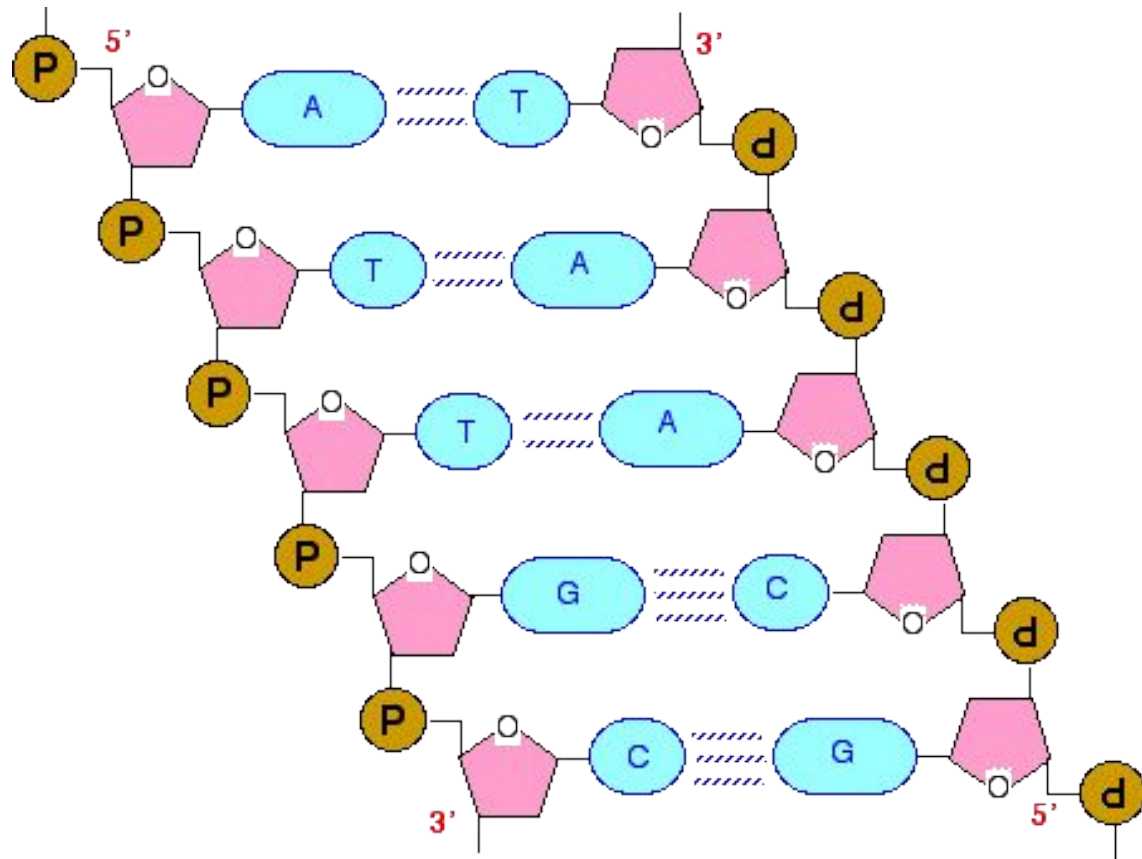


adenine (A)



guanine (G)

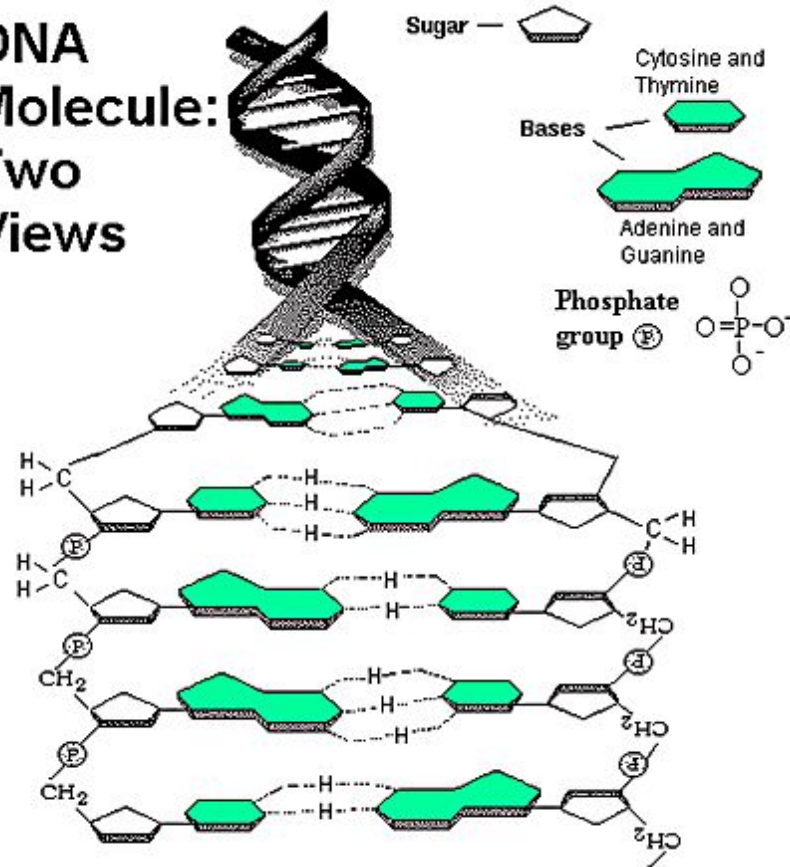




3'

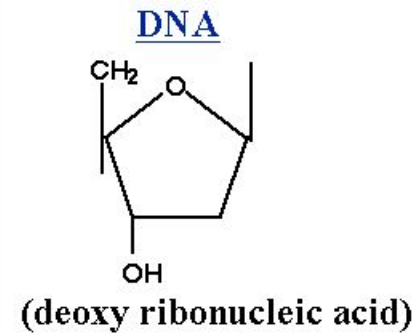
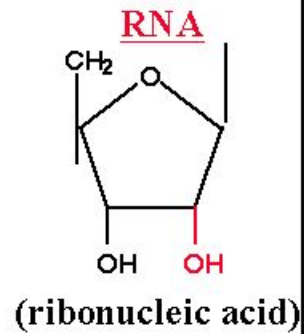
5'

DNA Molecule: Two Views

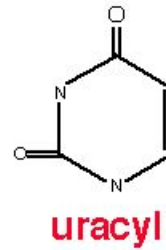


Differences between RNA and DNA

1) ribose sugar



2) T and U

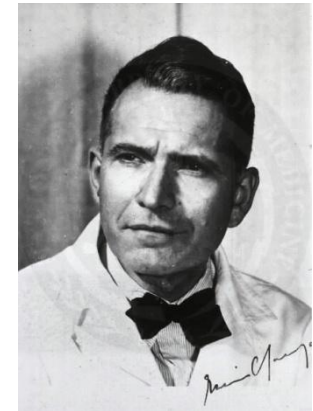
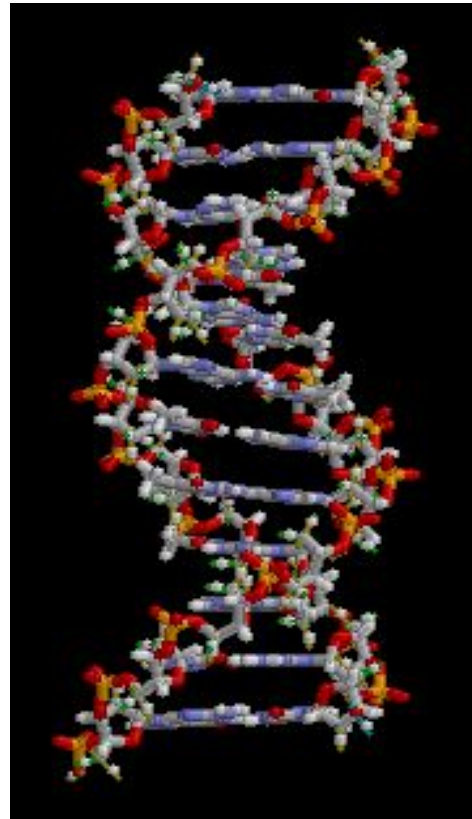


3) strand

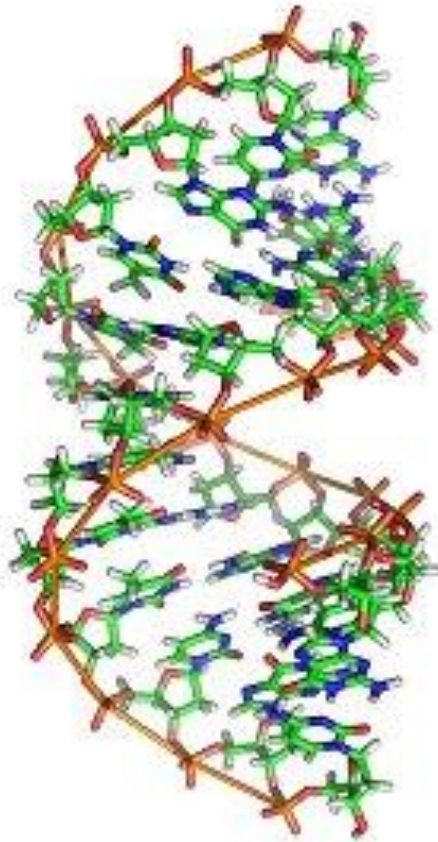
single

double

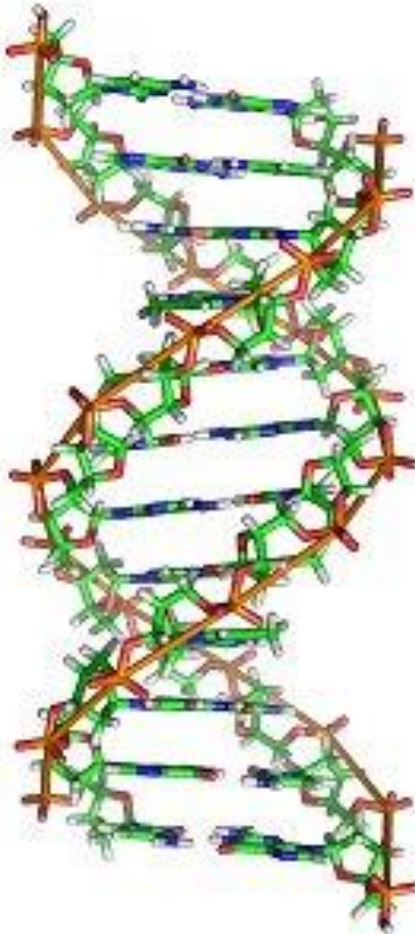
The greatest discovery!



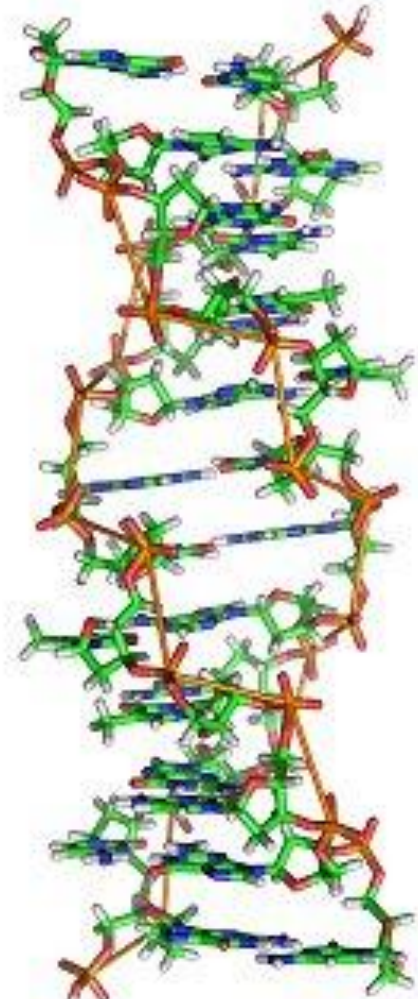
Form of DNA



A-form



B-form



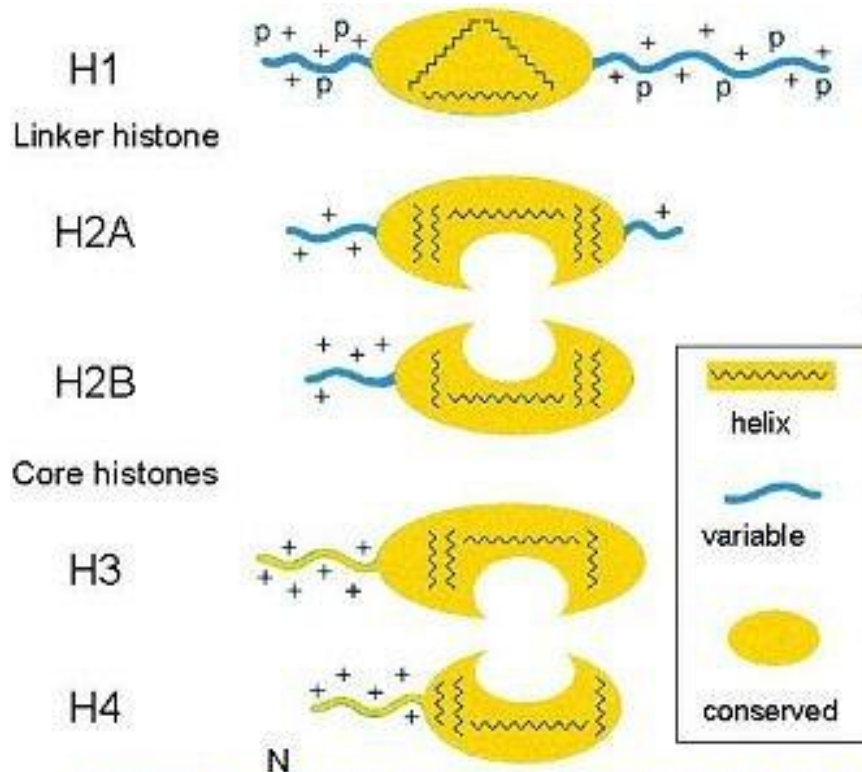
Z-form

Histones

- H2A, H2B, H3 и H4 – similar between distant species:
 - H3 of calf differs from H3 sea-urchin only in one amino acid and from green peas H3 in tree amino acids
 - H1 – more variable
 - birds possess H5 histone in erythrocytes instead H1
-

HISTONES

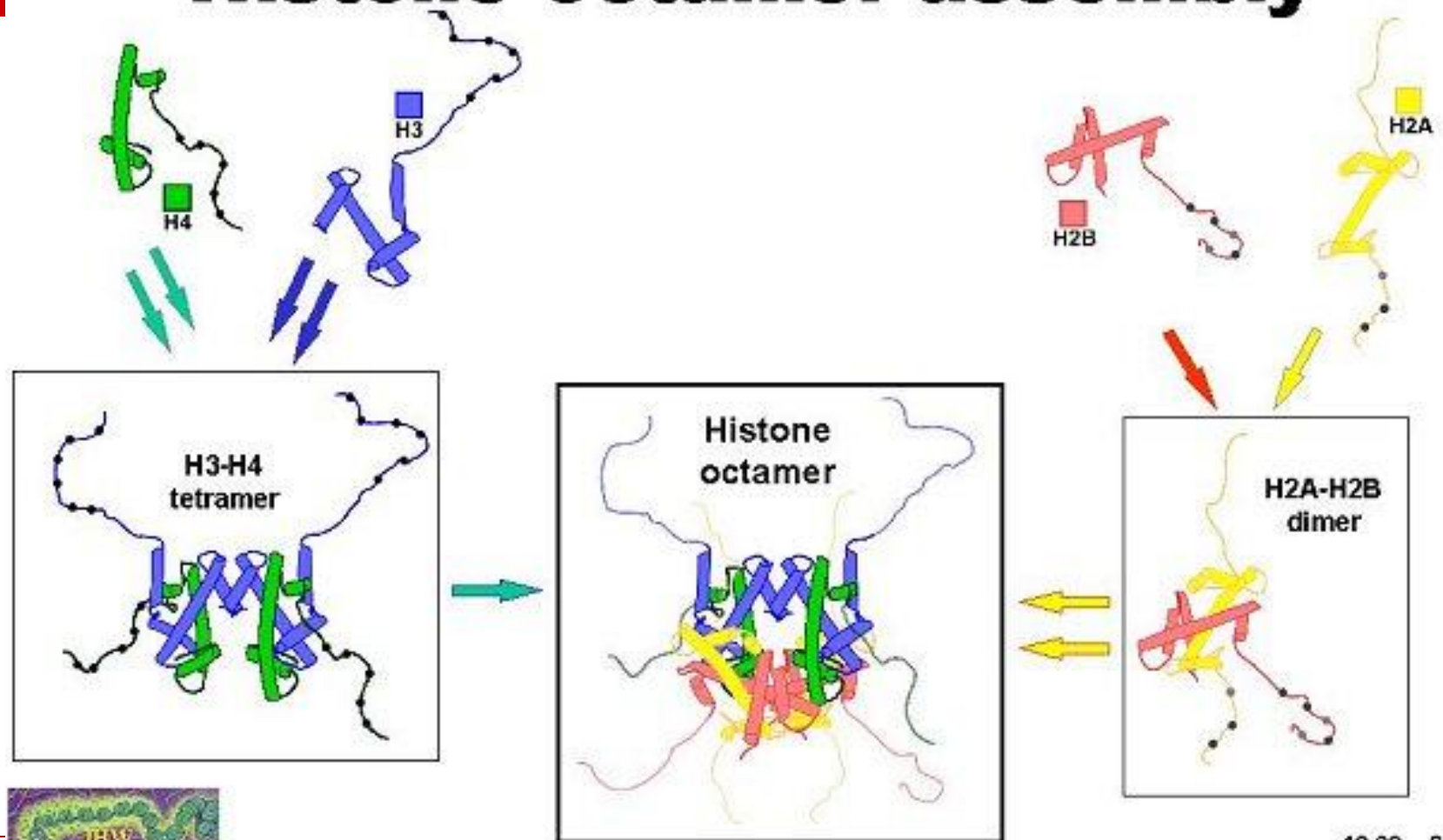
are highly conserved, small, basic proteins

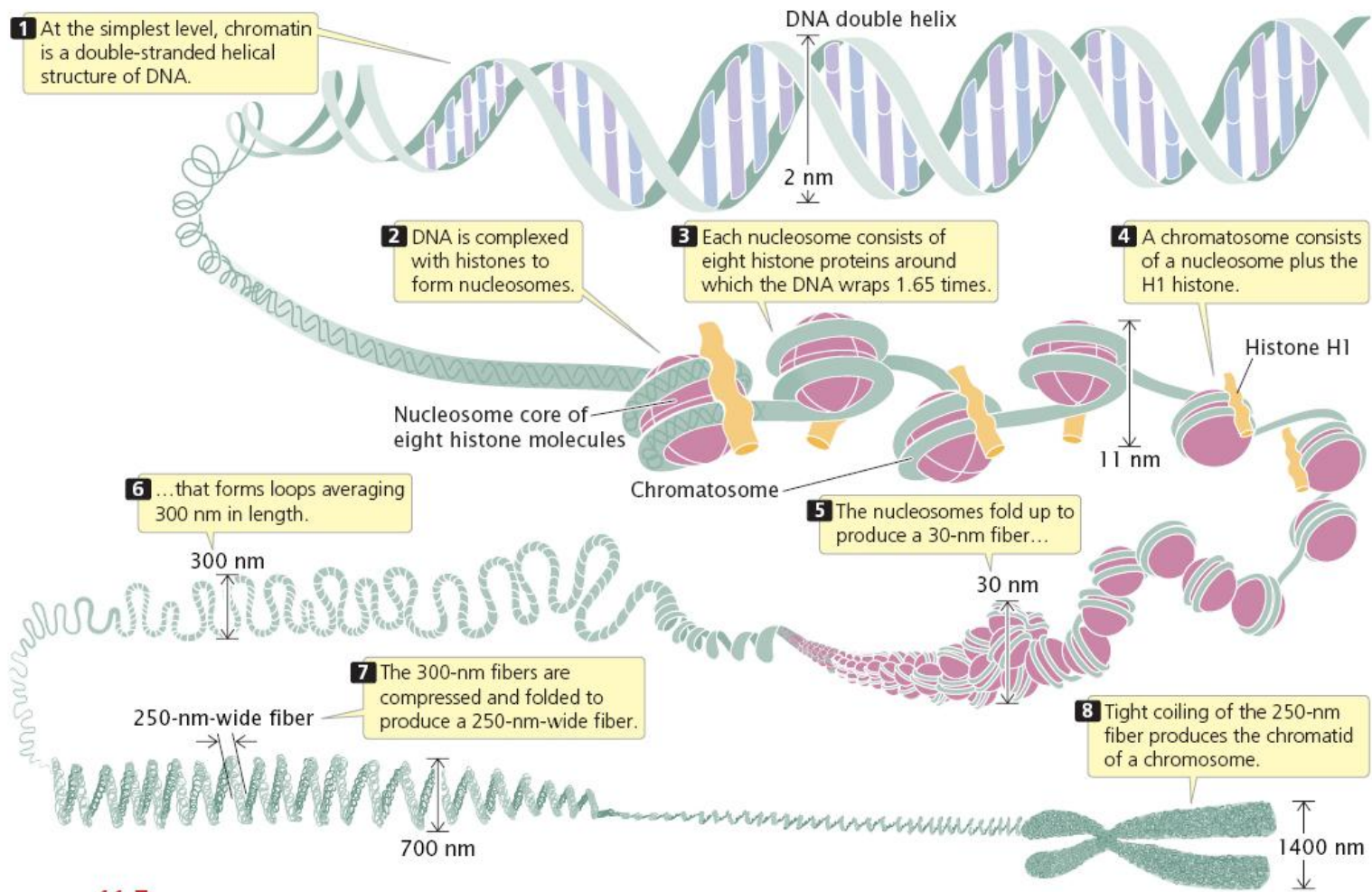


Histone Type	Molecular Weight	Number of Amino Acids	Approx. Content of Basic Amino Acids
H1	17,000–28,000	200–265	27% lysine, 2% arginine
H2A	13,900	129–155	11% lysine, 9% arginine
H2B	13,800	121–148	16% lysine, 6% arginine
H3	15,300	135	10% lysine, 15% arginine
H4	11,300	102	11% lysine, 4% arginine

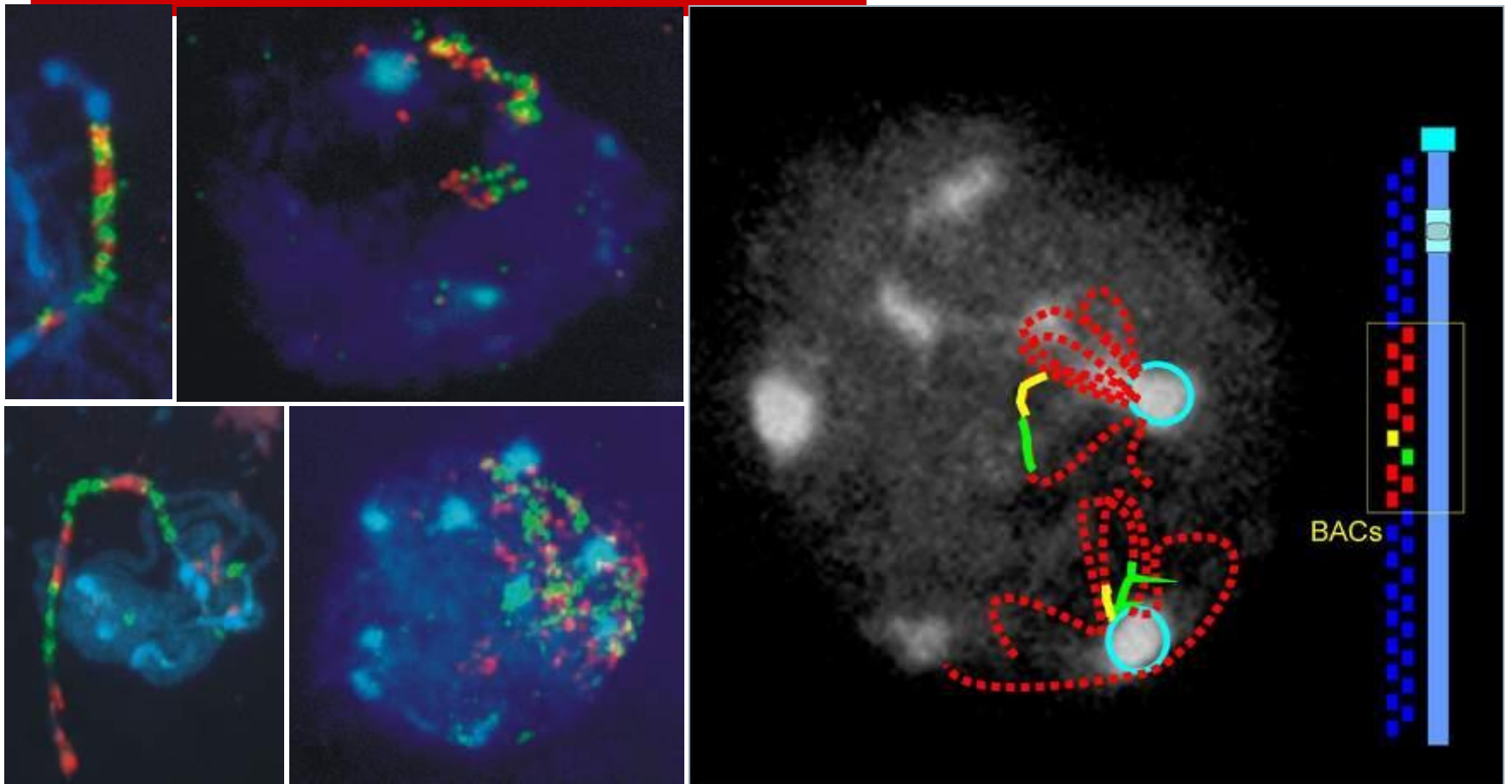


Histone octamer assembly



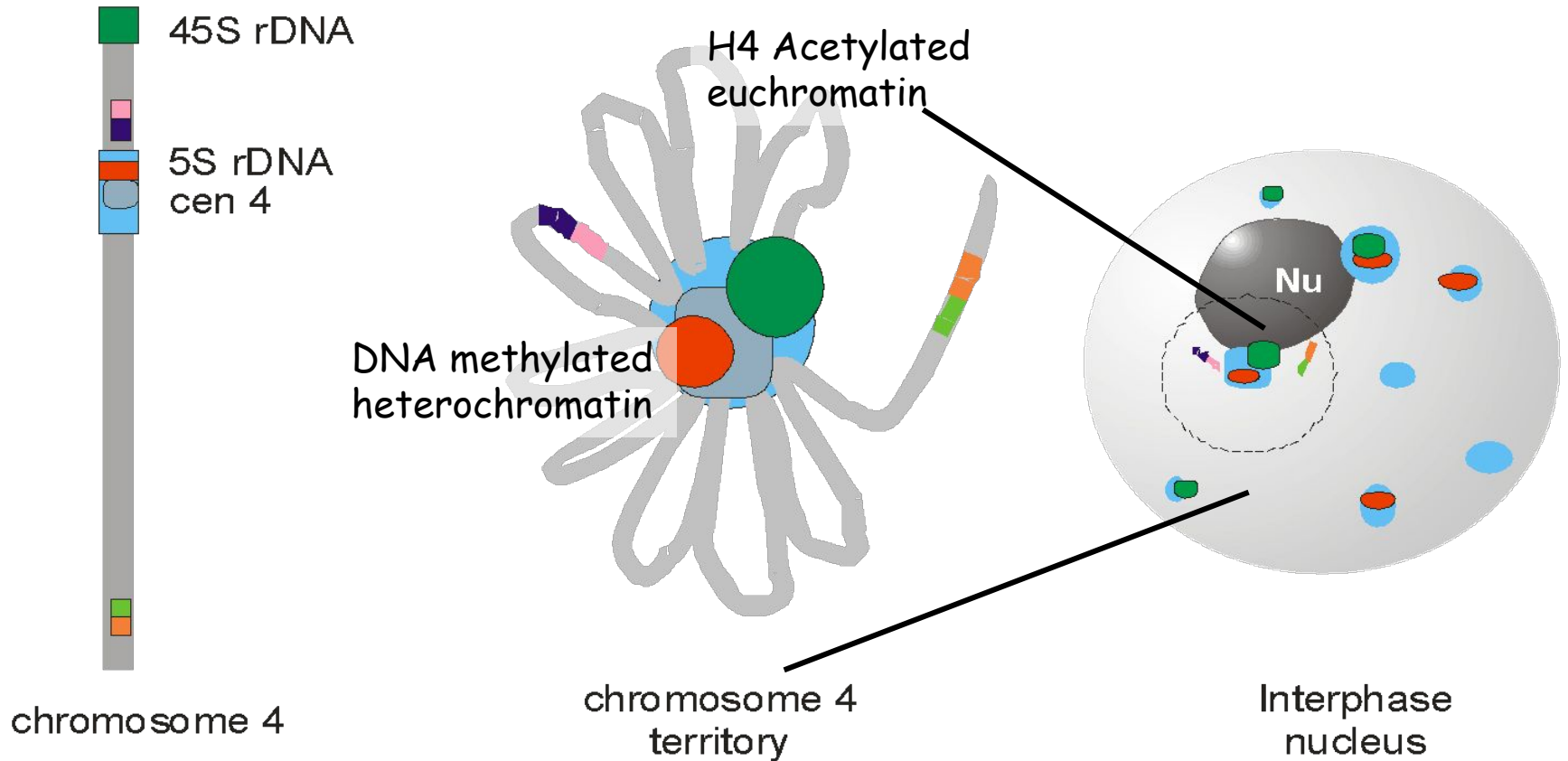


A simple interphase organization



From Prof. de Jong lecture, 2006

Interphase loop model



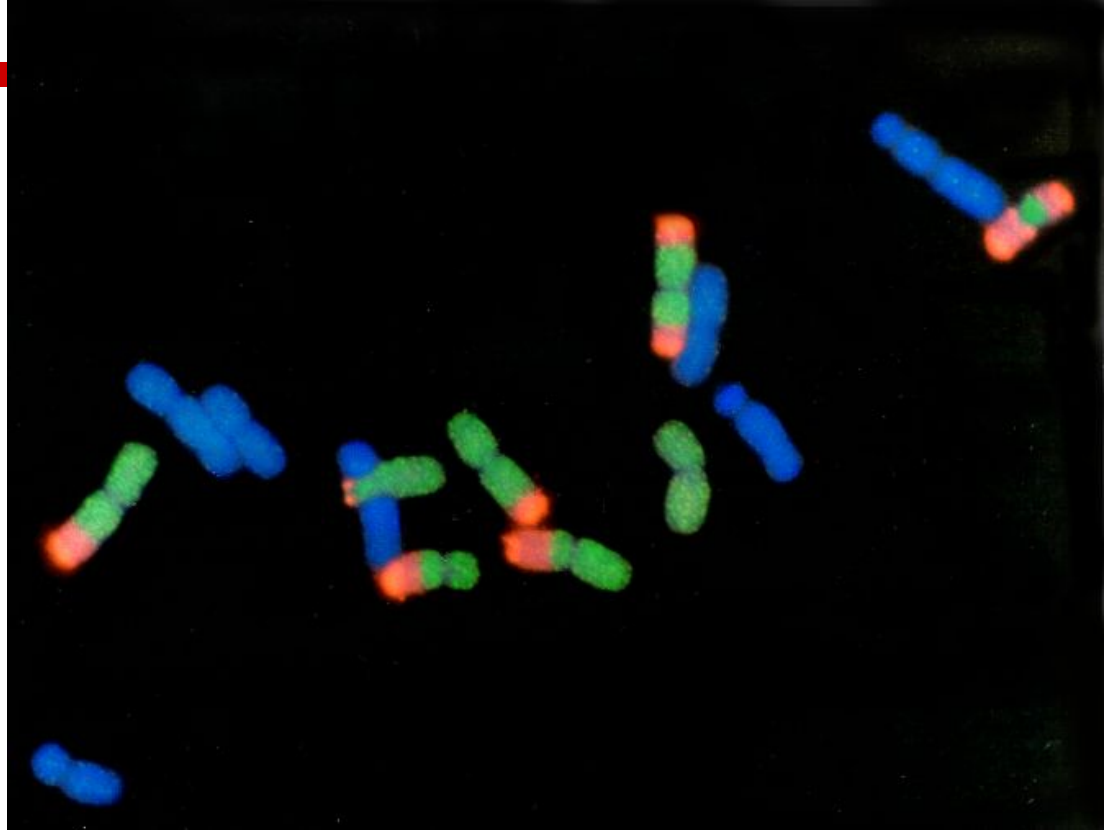
Trihybrid 1: CC x (FF x RR)

Mitosis: metaphase

■ *A. fistulosum* - Biotin, CY3

■ *A. roylei* - FITC

■ *A. cepa* - block DNA,
DAPI



Khrustaleva & Kik (1998) Theor Appl Genet 96: 8-14

FISH: Human chromosomes



Расположение 23 хромосом человека в прометафазе фибробластов

