

DNA Structure

Through Molecular Visualization
SMPatel

It is double helix

display not water

spin

spin off

Cartoon off

Wireframe 0.3

Right/ Left Handed?

Deoxyribose-Phosphate backbone

Plane of base at right angle to axis of DNA

A=T

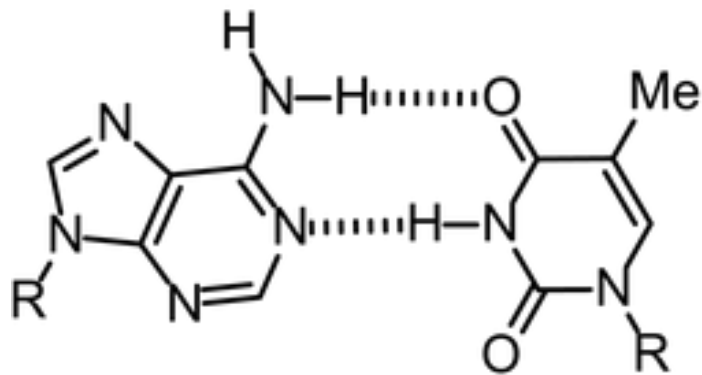
restrict 19:b , 6:A

wireframe

calculate hbonds

hbonds 0.1

display all (to see all)



A·T base pair

G≡C

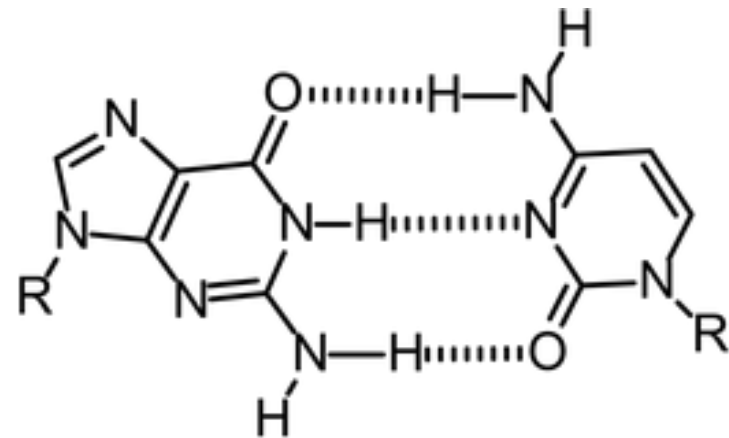
restrict 1:A, 24:b (G, C)

wireframe

calculate hbonds

hbonds 0.1

display all (to see all)



G·C base pair

Strands run anti-parallel

restrict 19:b , 6:A

spacefill 0.3

wireframe 0.1

restrict 1:A, 24:b

spacefill 0.3

wireframe 0.1

Look at deoxyRibose

Understand carbon numbering, start with O , count 5 carbon

Identify 3' and 5' carbon

See dRibose orientation on both side

restrict 19,20:b ,5, 6:A

restrict 19,20,21:b ,4,5, 6:A

DNA have grooves

restrict not water
spacefill
color cpk
select :a
color green
select :b
color red

Note down groove

one wide, major

One narrow, minor

Base of groove is made up of different atoms arranged in different way depending on DNA sequence

DNA have grooves

Specific sequence of DNA detection

- ssDNA=ssDNA (base pairing)
- ssDNA=RNA (base pairing)

Groove structure is sequence specific and used by proteins to identify specific sequence on DNA

Grooves bind protein in sequence specific way

display not water
cartoon off

restrict DNA
spacefill
color cpk
wireframe 0

restrict protein
Spacefill

restrict protein,DNA
spacefill
select protein
color blue
spacefill 0.1
dots
select T,A
color green

Notice

TATA box

Protein is call TBP (TATA Binding protein)

DNA-Protein inteaction regulate DNA expression

They are of three types Long, Short and Crazy

b-DNA

- right handed,
- hydrated,
- 10 bp/turn
- DNA and base axis parallel

a-DNA

- right handed,
- dehydrated,
- 11 bp/turn
- DNA and base axis 20' angle

b-DNA

- left handed,
- hydrated,
- 12 bp/turn
- dR-P-dR-P backbone zig-zag

DNA sequence in our cell

- 1.5 gigabytes
- Sufficient to make weapons and kill fellow human beings



Rosalind Franklin



She studied crystals of DNA by XRay Crystallography

Her data was used by by Crick and Watson to derive DNA structure, for which both received novel prize in 1962.

Franklin was never nominated for Nobe prize.

She had died in 1958

The Double Helix

In his book Watson writes....

In 1958, Rosalind Franklin died at the early age of thirty-seven. My initial impressions of her, both scientific and personal were often wrong,

....realizing years too late the struggles that the intelligent woman faces to be accepted by a scientific world which often regards women as mere diversions from serious thinking.

Rosalind's exemplary courage and integrity were apparent to all when, knowing she was mortally ill, she did not complain but continued working on a high level until a few weeks before her death.