

# Gene expression in Eukaryote

classmate

Date \_\_\_\_\_

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## Topoisomerases

They are meant for the resolution of super coiling. The DNA cleavage by all the Topoisomerases is accomplished by ~~the~~ <sup>reformation</sup> of triscent phosphodiester bond b/w a <sup>specific</sup> tyrosin residue of the enzyme one of the two broken ends of the DNA.

### Topoisomerases

#### CLASS I

1. cause nick (ss cut)
2. don't use ATP
3. Monomer
4. Cause  $\Delta LK = +1$

#### CLASS II

1. Causes break (ds cut)
2. Use ATP/ $Mg^{++}$
3. dimer heterodimer (Prok.)  
Homodimer (Euk.)
4. Causes  $\Delta LK = -2$

2 subclass

#### Subclass - I

- Needs unbound DNA
- Needs  $Mg^{++}$
- binds 5' broken end of DNA

eg. Eubacterial  
- Top. I & II

- Yeast TOP-II

- Mammalian TOP-II

Reverse gyrase  
of bacteria.

go to prokaryotes  
bacteria (ISC)

#### Sub-class II

- No such needs
- " " "
- binds 3' broken end of DNA.

eg. Human TOP. I  
- ~~Eubacterial~~

2 classes  
on the basis of struc.

#### Subclass - IIA

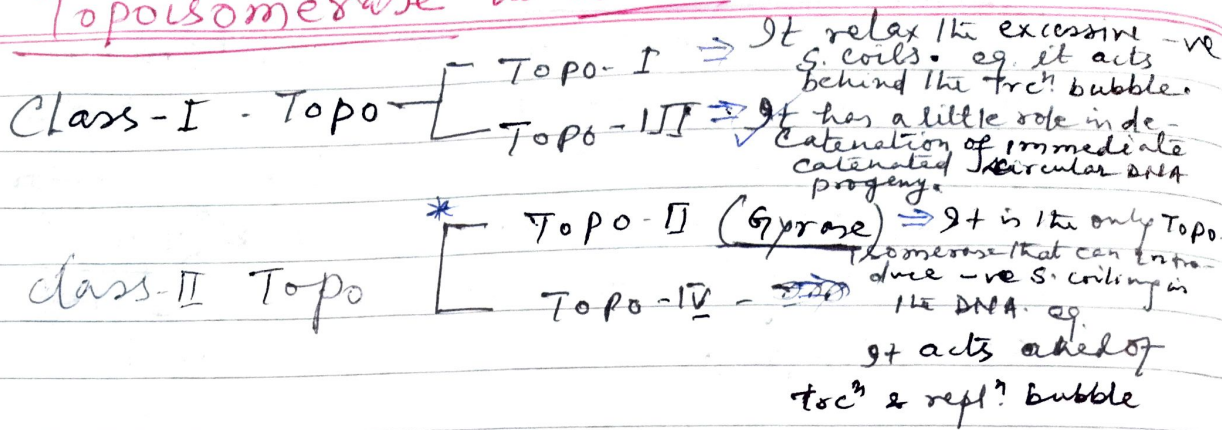
- eg. Eubacterial TOP II & IV
- Eukaryotic TOP. II

#### Subclass IIB

- eg. → Topo. V of archeobacteria

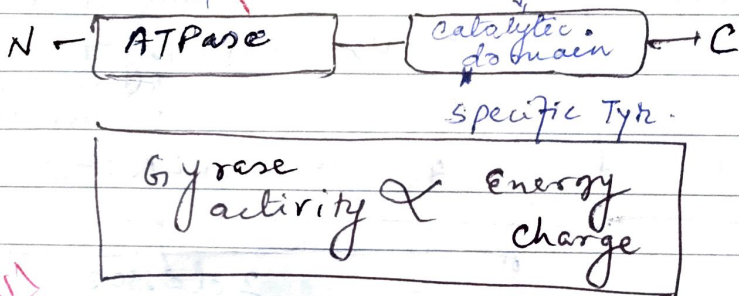
V.V.I = Reverse gyrase present in extreme thermophiles (not present in E. coli & many of eubacteria) cause introduce positive super coiling to compensate the high temp. so that the structural integrity of DNA in extreme thermophiles can be maintained.

# Topoisomerase in E. coli



\* Topoisomerase II (Gyrase) (Heterodimer Struc)

Gene gyrase B      Gene gyrase A



\* TOPO-IV  $\Rightarrow$  It is the main enzyme that decatenate the daughter circular DNA. It also relax the  $\ominus$ ve as well as  $\oplus$ vely super coiled DNA.

## DNA Topology

Linking no<sup>2</sup>

$$LK = TW + Wr$$

The study of properties of an object that don't change under continuous deformation is known as Topology.

For the DNA the continuous deformations includes conformational changes in the DNA due to its interaction with proteins (Pool histon & non-histons prots). The dis continuous deformation in the DNA include DNA strand breakage. Under dis



