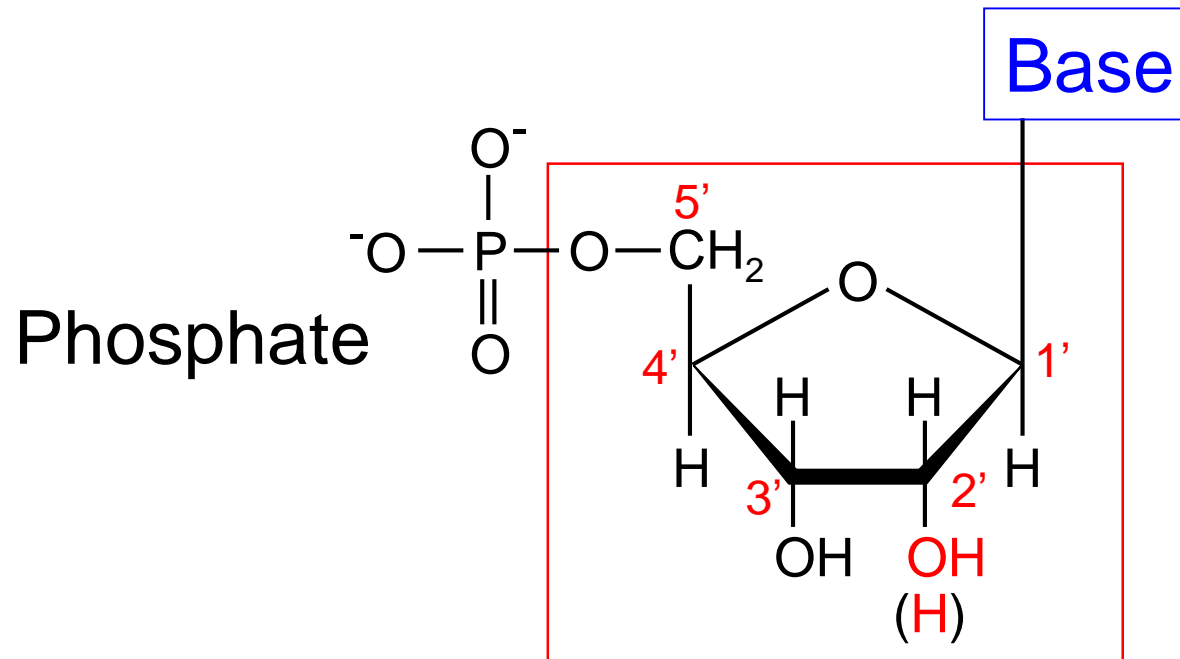


# 核酸的基本組成：

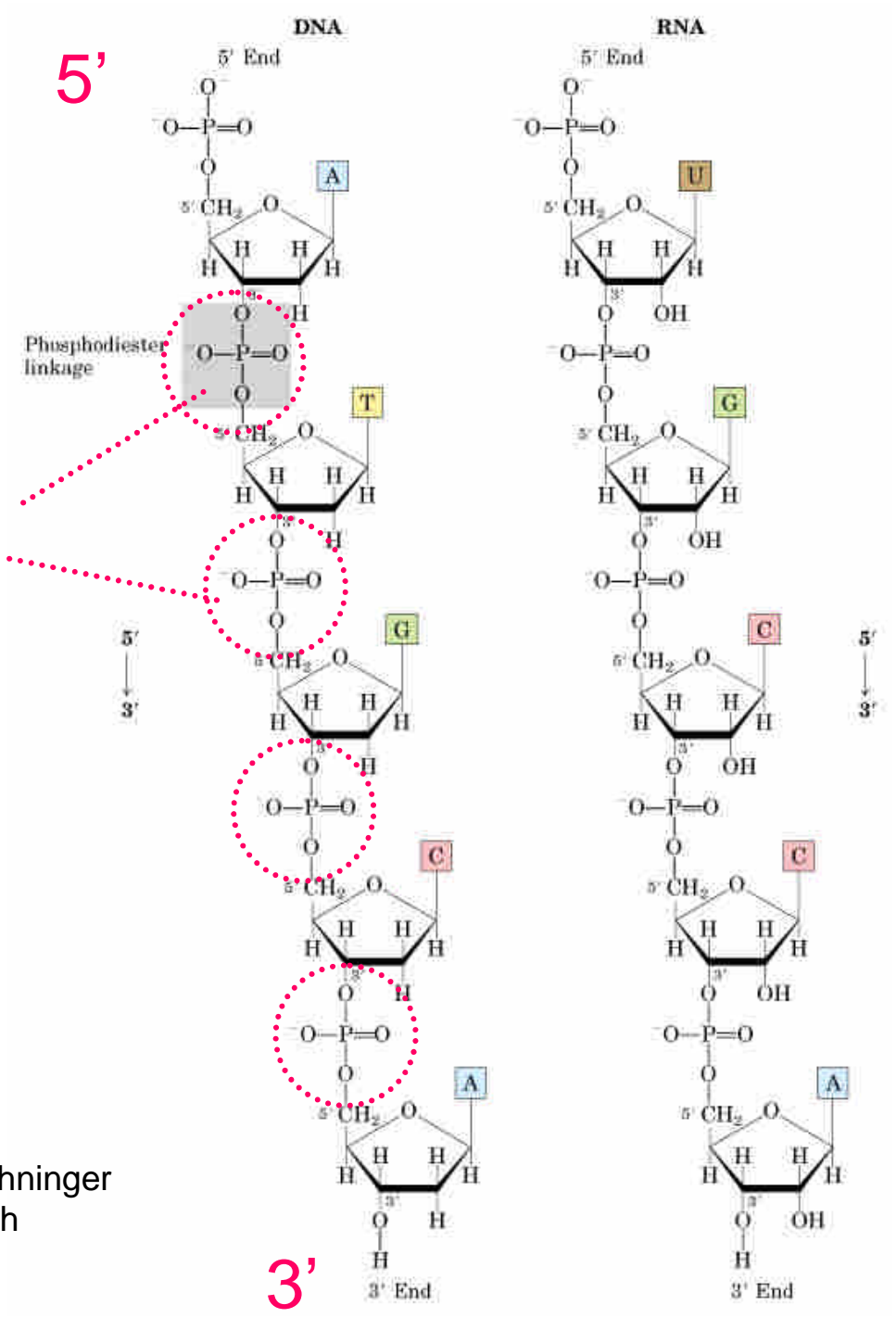


## Nucleotide –



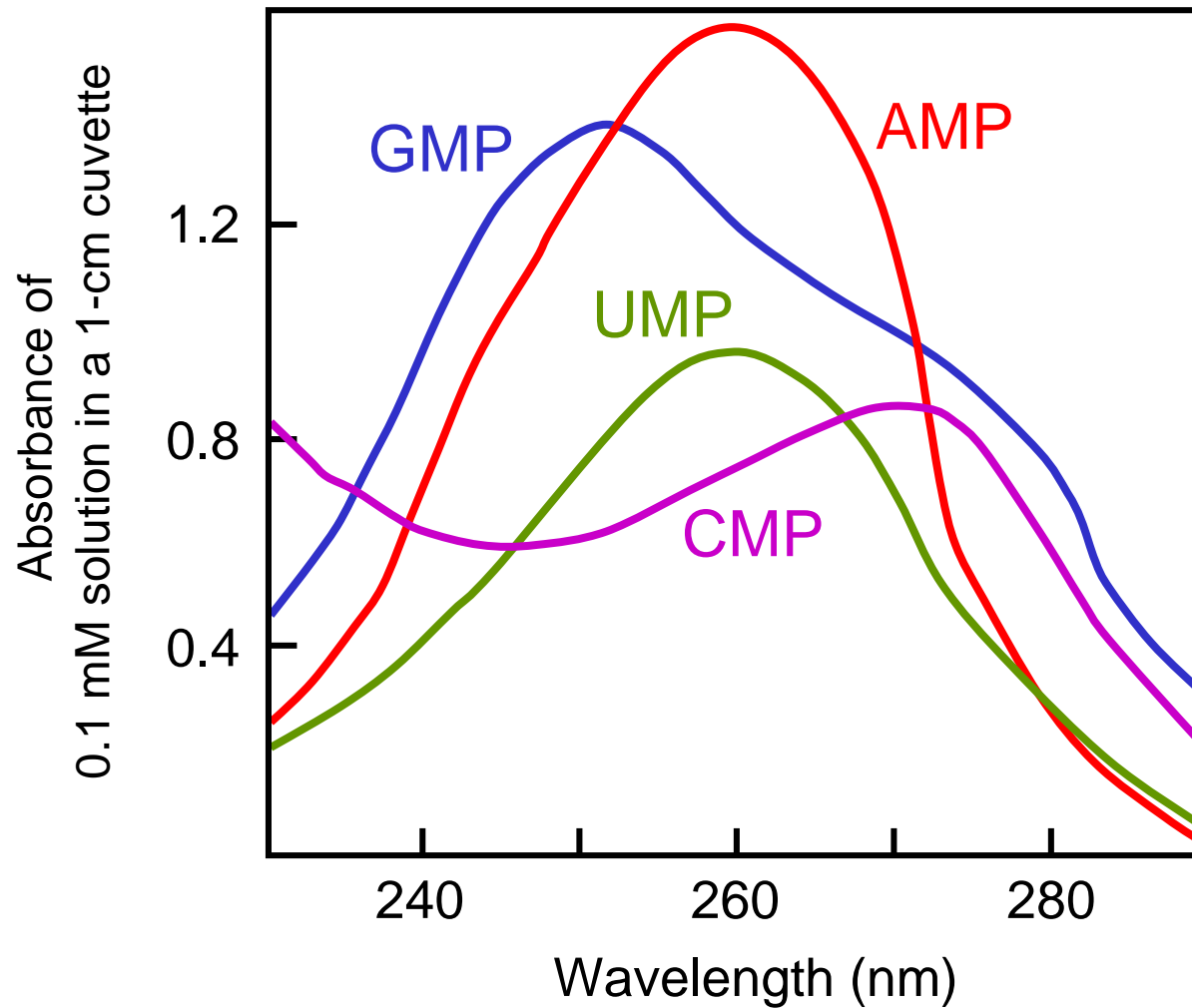
Ribose  
(Deoxyribose)

Phosphodiester linkage

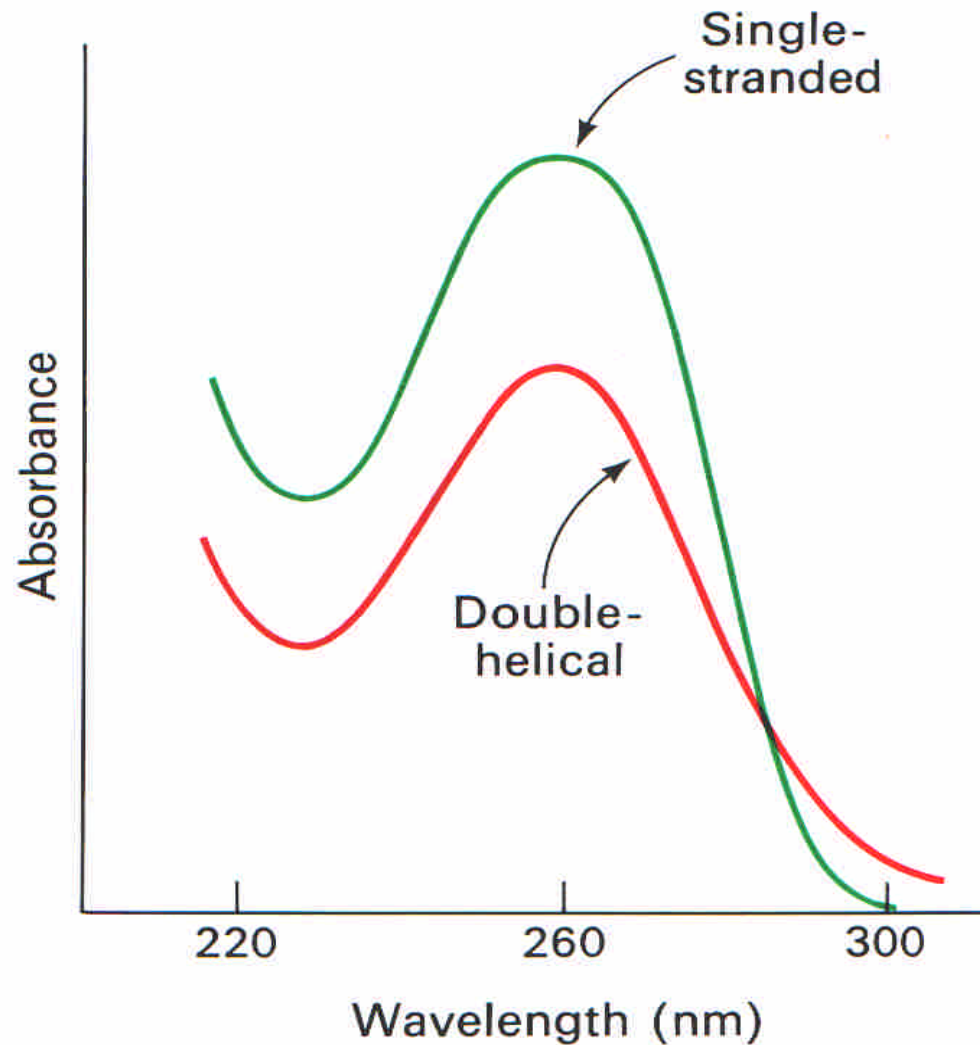


Nelson, D. L. and Cox, M. M. (2000) Lehninger Principles of Biochemistry. 3<sup>rd</sup> ed., Worth Publishers. Fig. 10-7

■ 核酸的物理性質：UV absorption of nucleotides

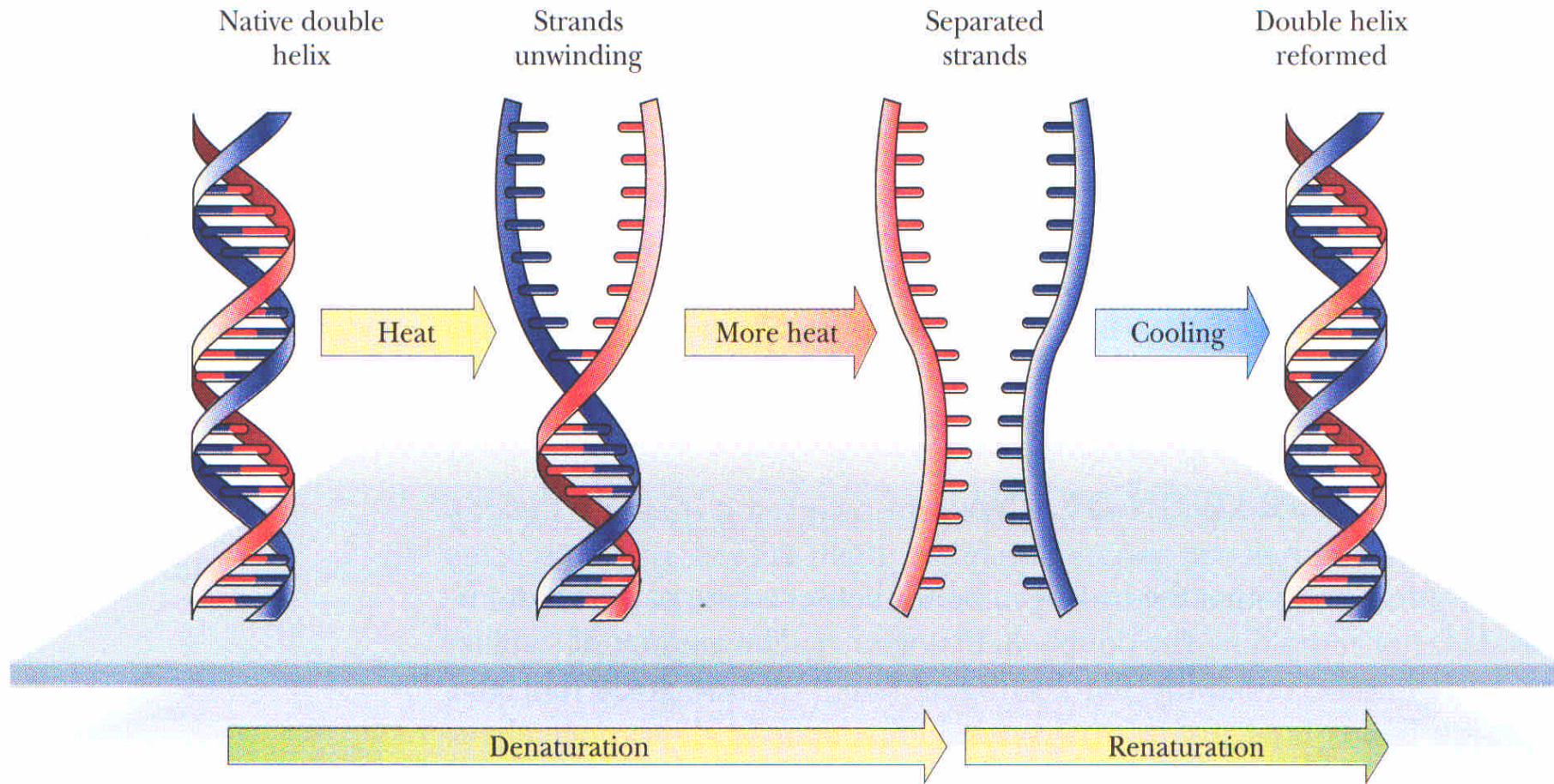


# ■ 核酸的物理性質：UV absorption of nucleic acids

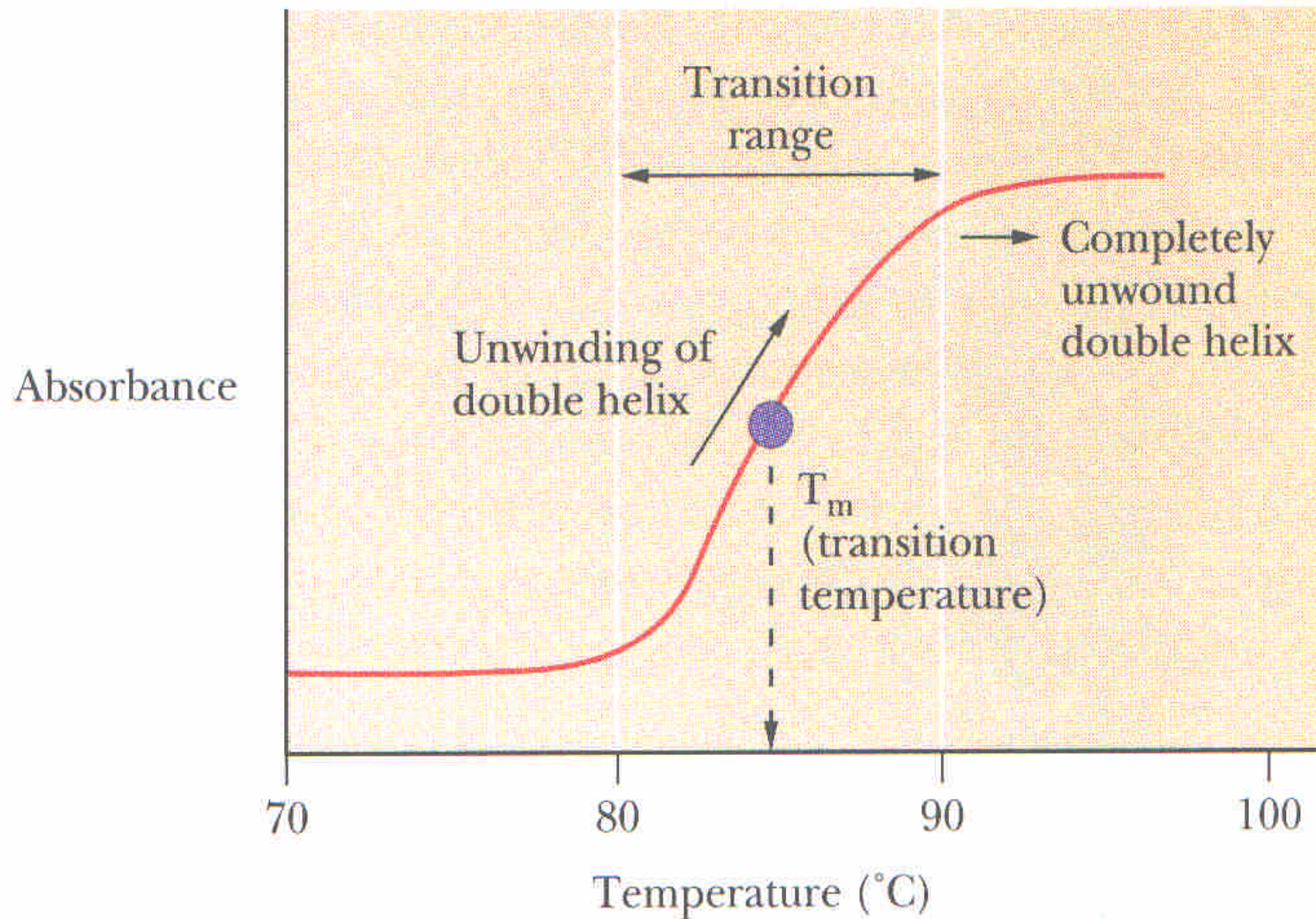


Stryer, L. (1995) Biochemistry. 4<sup>th</sup> Ed. W. H. Freeman and Company. Fig. 4-16

# 核酸的物理性質：Denaturation & Renaturation

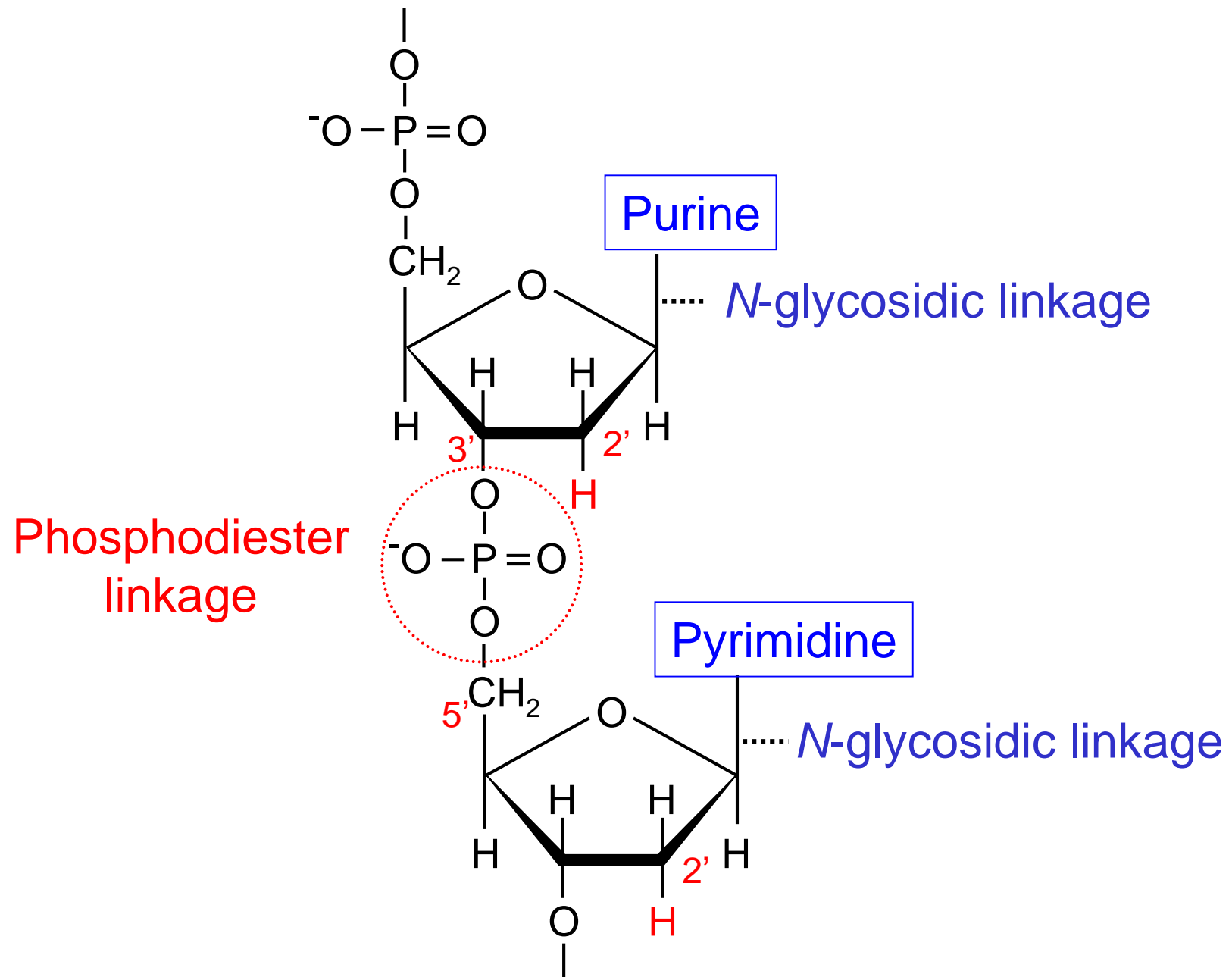


Campbell, M. K. (1999) Biochemistry. 3<sup>rd</sup>. Harcourt Brace College Publishers. Fig. 7.14.

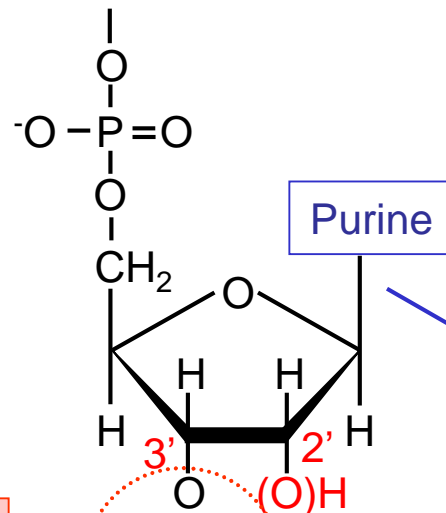


Campbell, M. K. (1999) Biochemistry. 3<sup>rd</sup>. Harcourt Brace College Publishers. Fig. 7.13.



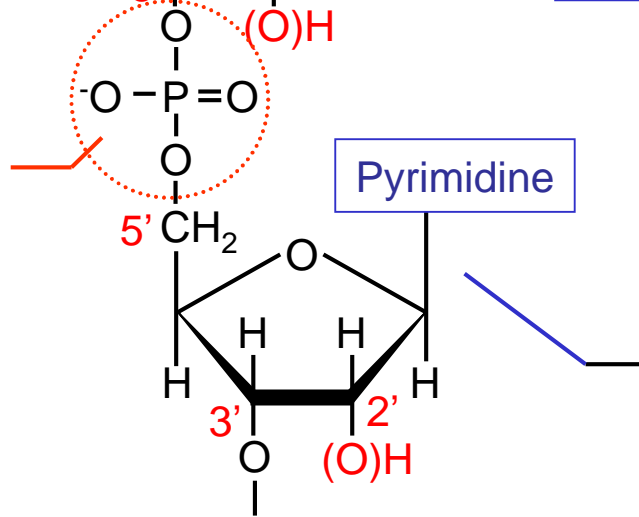


# 核酸的化學性質：



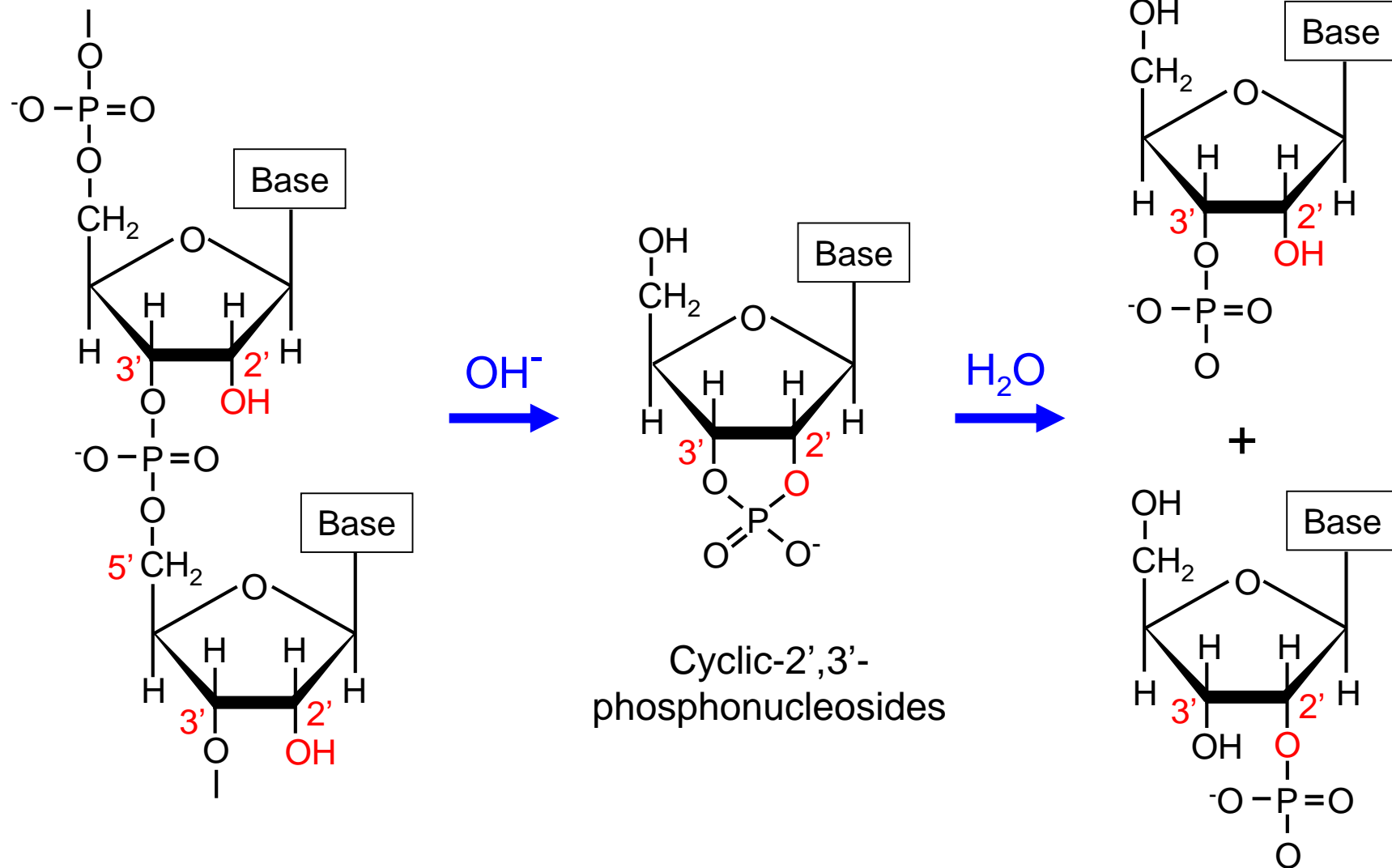
- Stable in mildly alkaline or acidic condition
- Depurinated at strong acidic condition

- In alkaline condition:  
DNA – stable  
RNA – hydrolyzed
- Unstable during depuration or depyrimidination

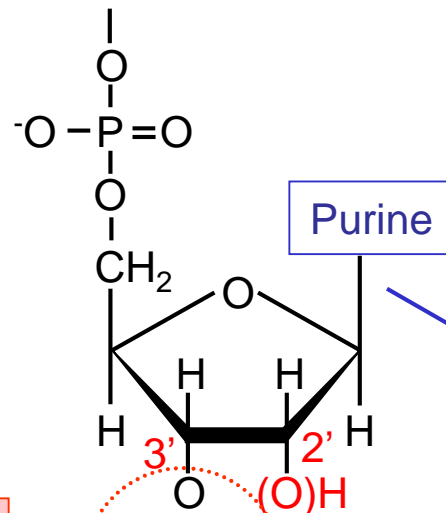


- Stable in mildly alkaline or acidic condition
- Depyrimidinated at harsh acidic condition

# Alkaline hydrolysis of RNA

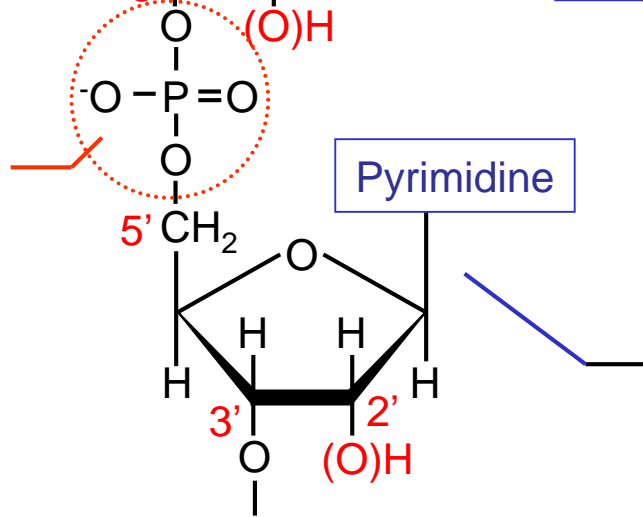


# 核酸的化學性質：



- Stable in mildly alkaline or acidic condition
- Depurinated at strong acidic condition

- In alkaline condition:  
DNA – stable  
RNA – hydrolyzed
- Unstable during depuration or depyrimidination

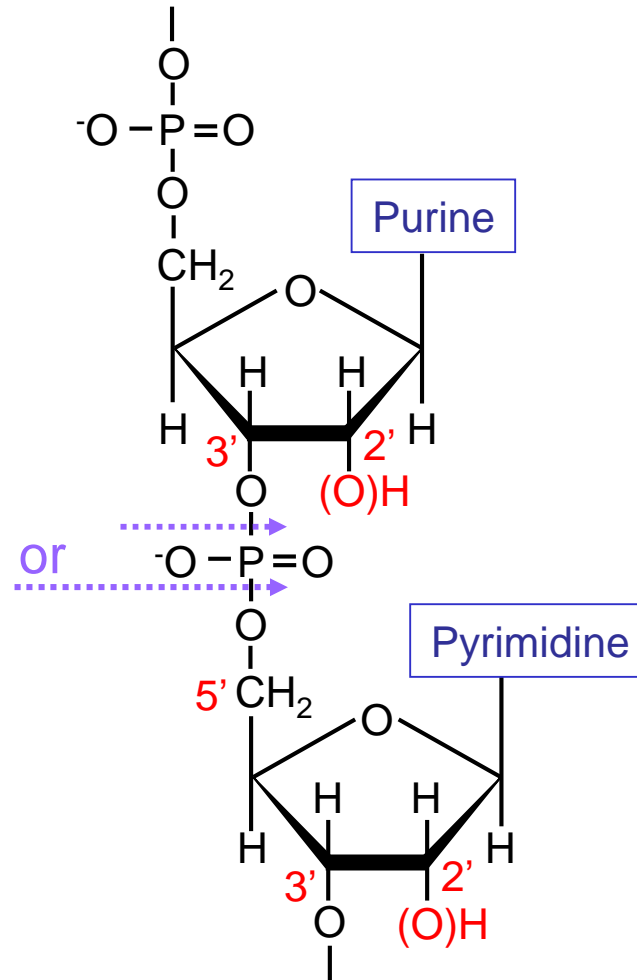


- Stable in mildly alkaline or acidic condition
- Depyrimidinated at harsh acidic condition

# ■ 核酸的化學性質：



Nucleases



# Nucleases 種類相當多



## *Nucleases –*

水解 DNA 或 RNA 之 phosphodiester linkages 的酵素

- ▶ Non-specific cleavage

- ▶ Specific cleavage

- ▶ DNases or RNases

- ▶ Exonucleases or endonucleases

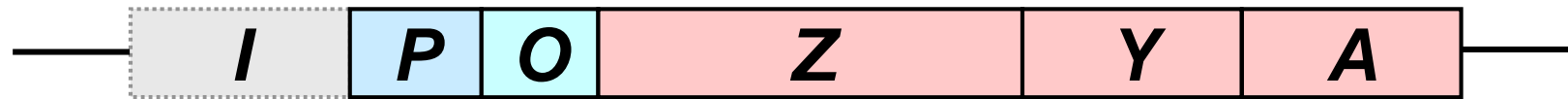
- ▶ Base specificity

- ▶ Sequence specificity

■ BCX 核酸部分的主角：



*E. coli lac* operon



*lac* mRNA

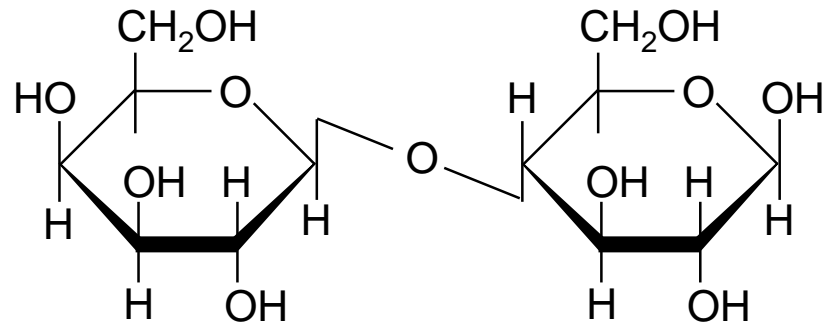


$\beta$ -Galactosidase

Permease

Transacetylase

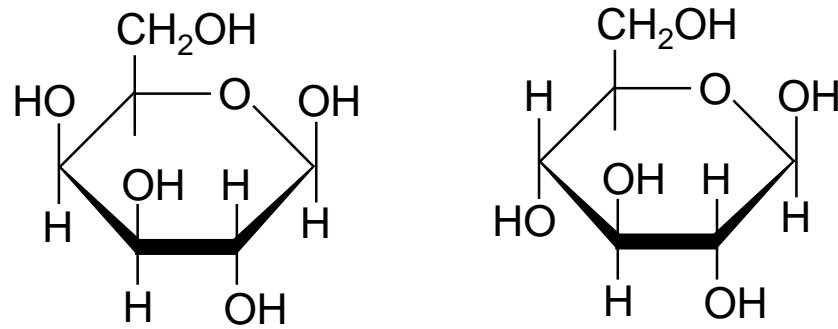




Lactose



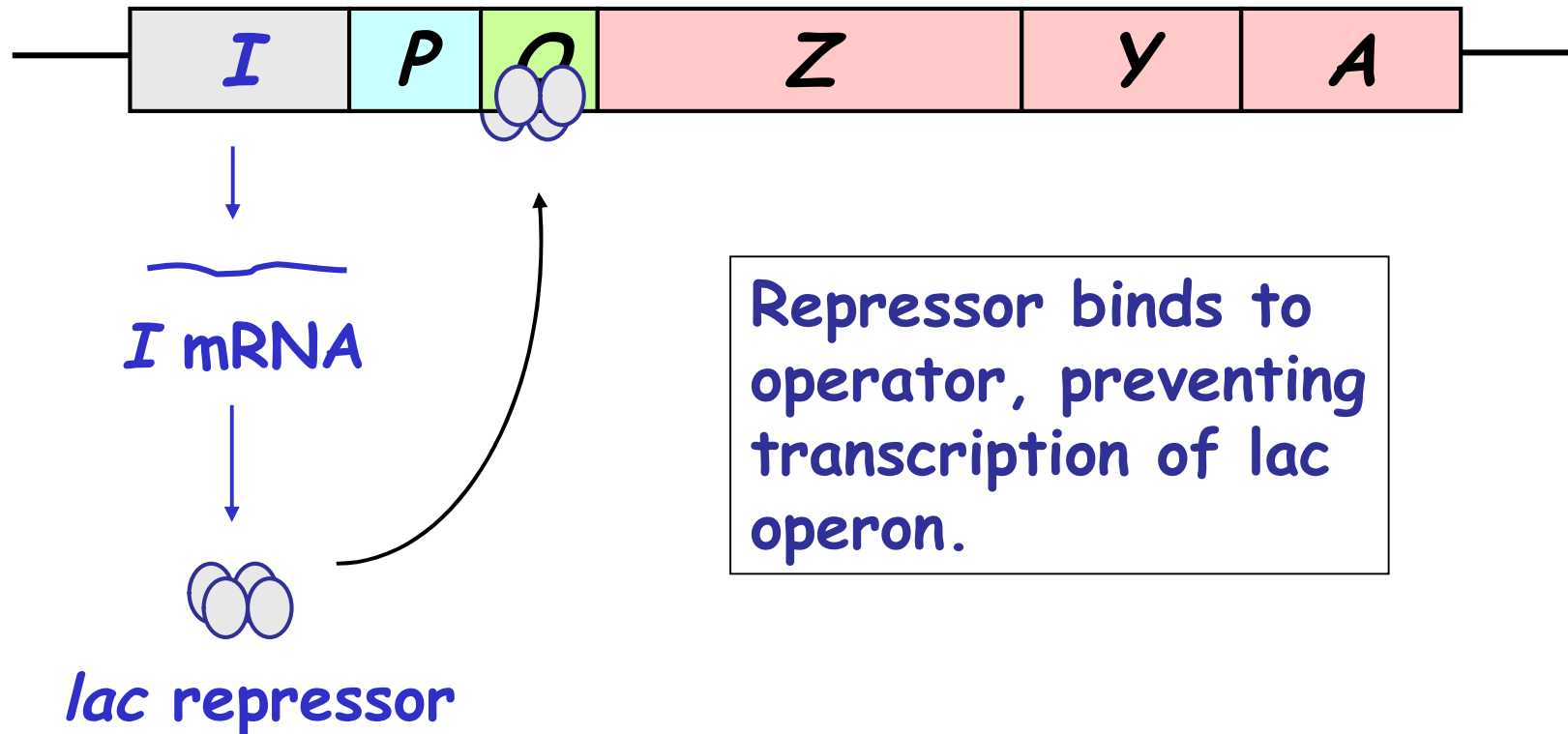
Galactose + Glucose



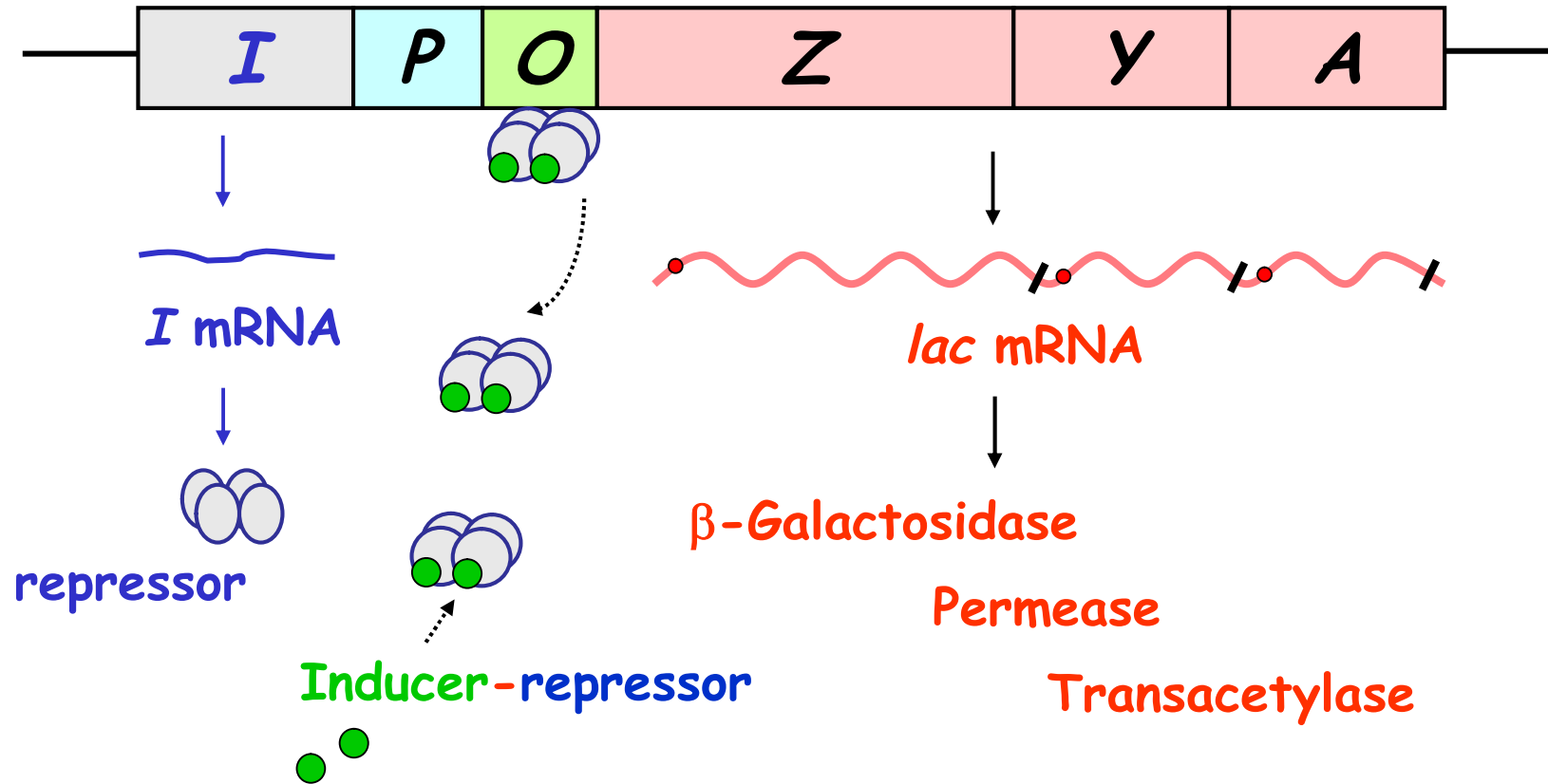


# The expression of the lac operon:

(1) Absence of inducer:



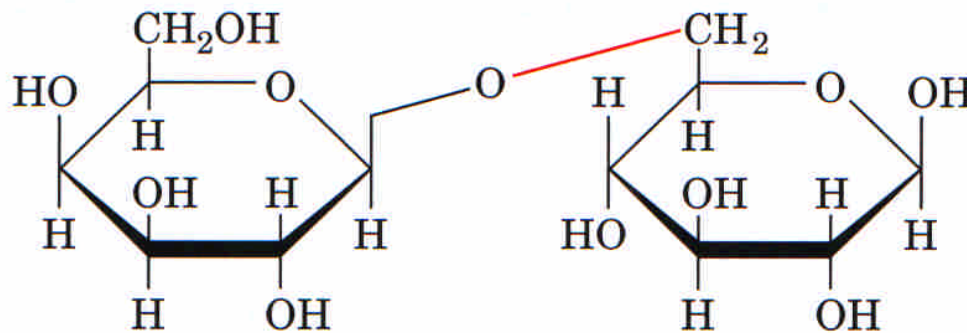
## (2) Presence of inducer ●



Inducer-repressor complex  
can not bind to operator.

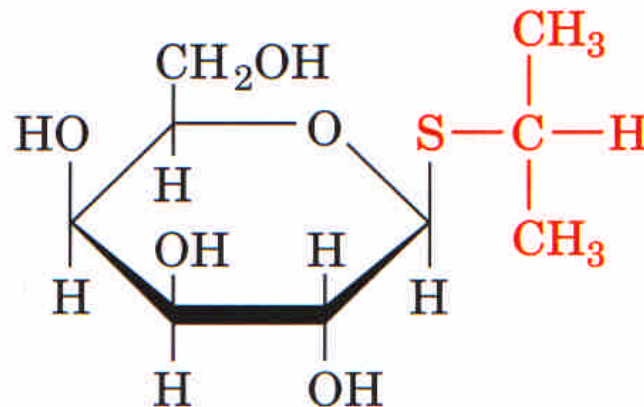
Transcription and translation  
of lac structural genes occur.

# Inducers of the lac operon:



**1,6-Allolactose**

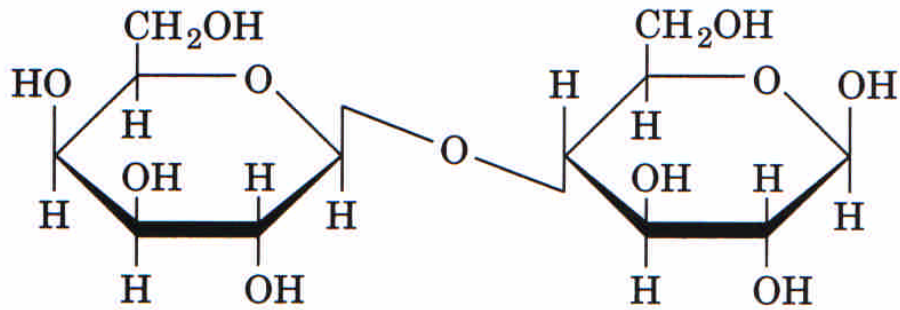
**Physiological  
inducer**



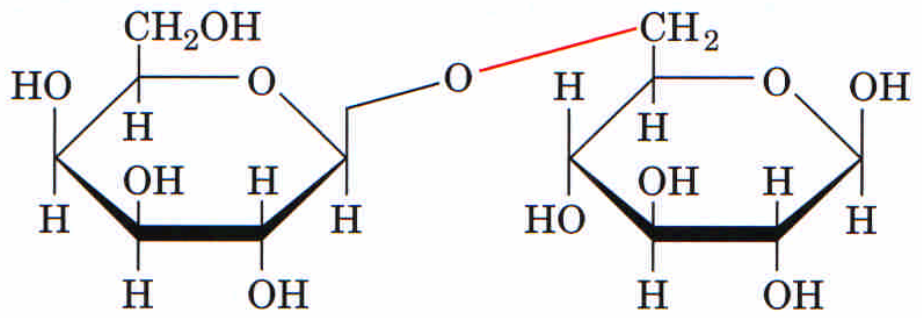
**Isopropylthiogalactoside (IPTG)**

**Synthetic  
inducer**

圖引用自：Voet, D., Voet, J. G. and Pratt, C.W. (1999) Fundamentals of Biochemistry. John Wiley & Sons, Inc. p.895



**Lactose**  
↓  
 $\beta$ -galactosidase



**1,6-Allolactose**

$H_2O$  —  $\beta$ -galactosidase  
↓

**Galactose + Glucose**

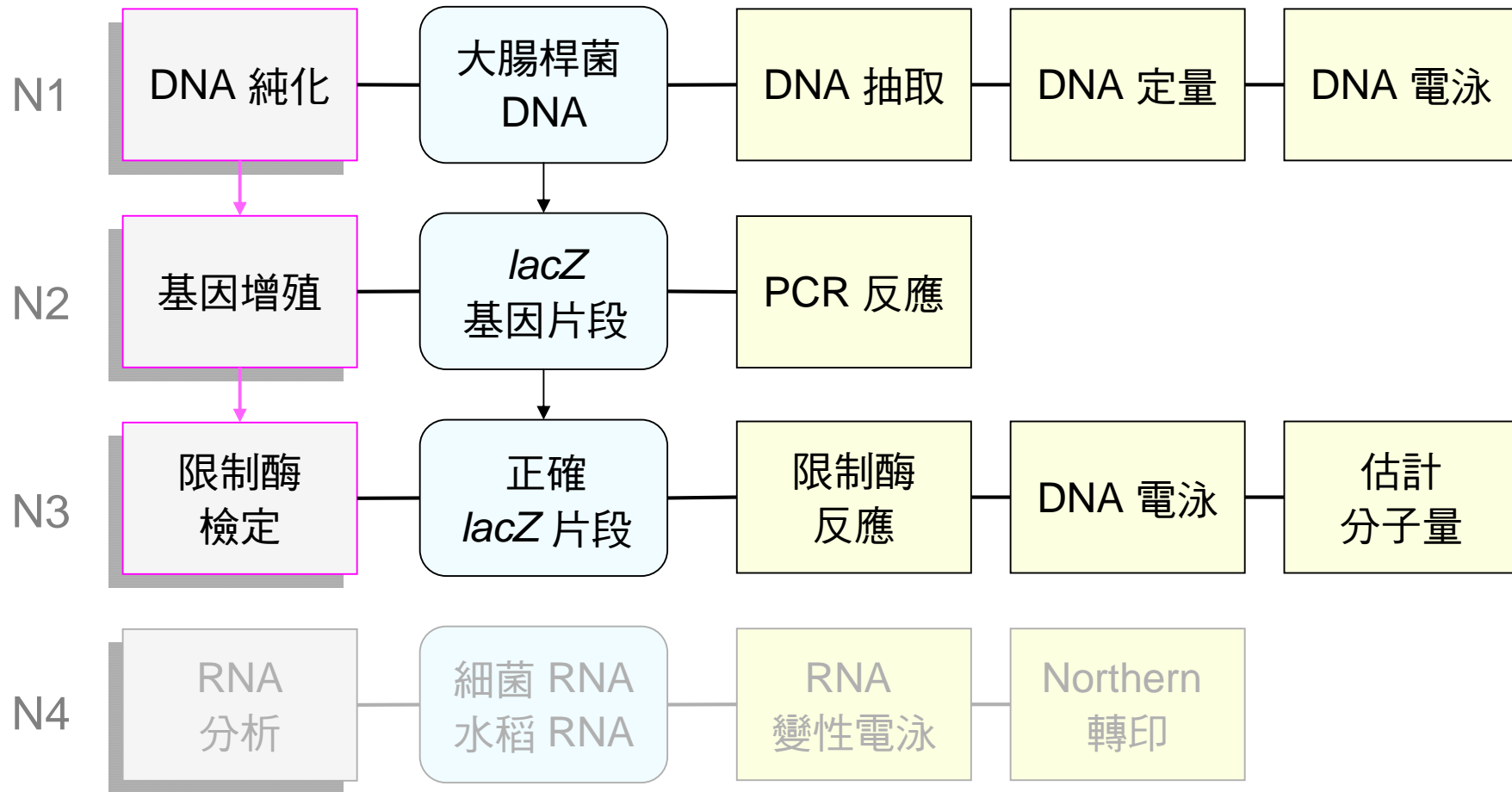
transglycosylation

What happens to the expression of the lac operon when both glucose and lactose are present?

Catabolite repression

Glucose	Lactose	Transcription
+	+	off
+	-	off
-	+	on
-	-	off

# 核酸部分的學習目的：



## ■ 核酸部分成績評量：



- 平常上課表現 40%
- 實驗報告 60%

報告繳交期限：

報告	週二班	週三班
N1	12/27	12/28
N2/N3	1/3	1/4

## 你準備好了嗎？

- 我熟知實驗室安全守則。
- 我還記得生化在講些什麼。
- 我還記得核酸的結構與物理、化學性質。
- 老師會隨時提出問題或請同學上台授課。
- 不能缺席。遲到要請客、罰勞役或回答問題。
- 核酸實驗很繁瑣並會用到突變劑，要全神貫注。
- 實驗失敗不能氣餒，一定要找出原因，累積經驗。