

GLI ACIDI NUCLEICI

Polimeri specializzati nell'immagazzinare, trasmettere e utilizzare le informazioni genetiche

DNA - Acido deossiribonucleico

RNA - Acido ribonucleico

LA COMPOSIZIONE CHIMICA DEL DNA E' MOLTO SEMPLICE

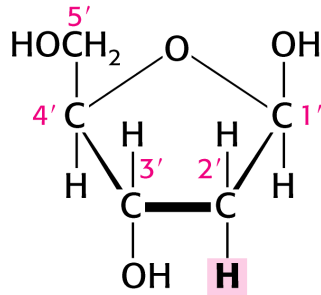
BASI AZOTATE

DEOSSIRIBOSIO

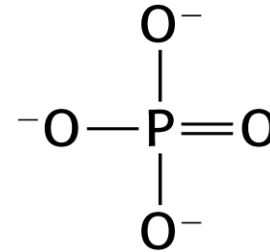
ACIDO FOSFORICO

1 : 1 : 1

I COMPONENTI DEI NUCLEOTIDI



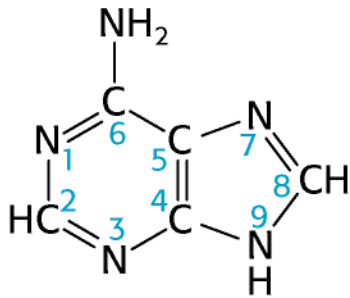
Deossiribosio



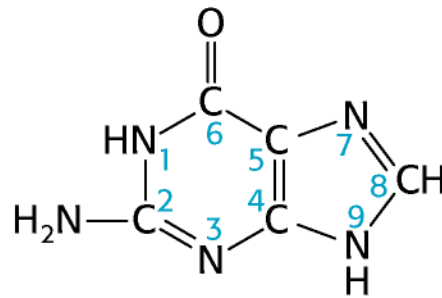
Fosfato

LE QUATTRO BASI DEL DNA

PURINE

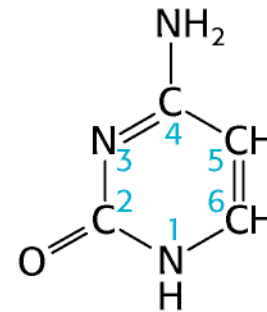


Adenina (A)

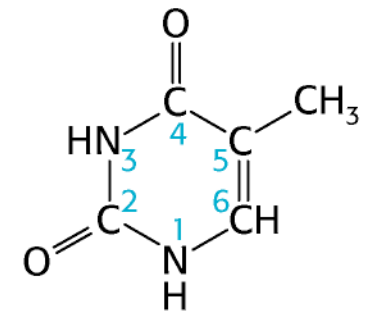


Guanina (G)

PIRIMIDINE

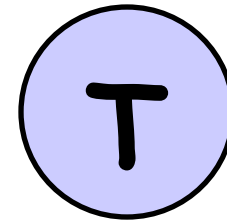


Citosina (C)

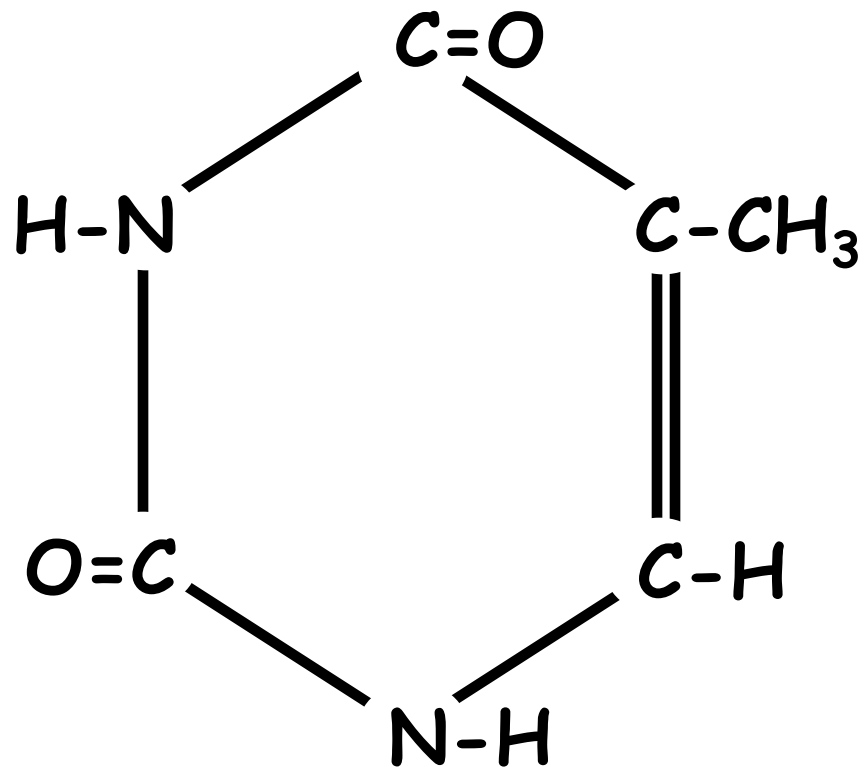


Timina (T)
(presente nel DNA)

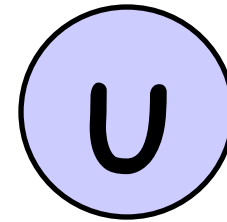
PIRIMIDINE



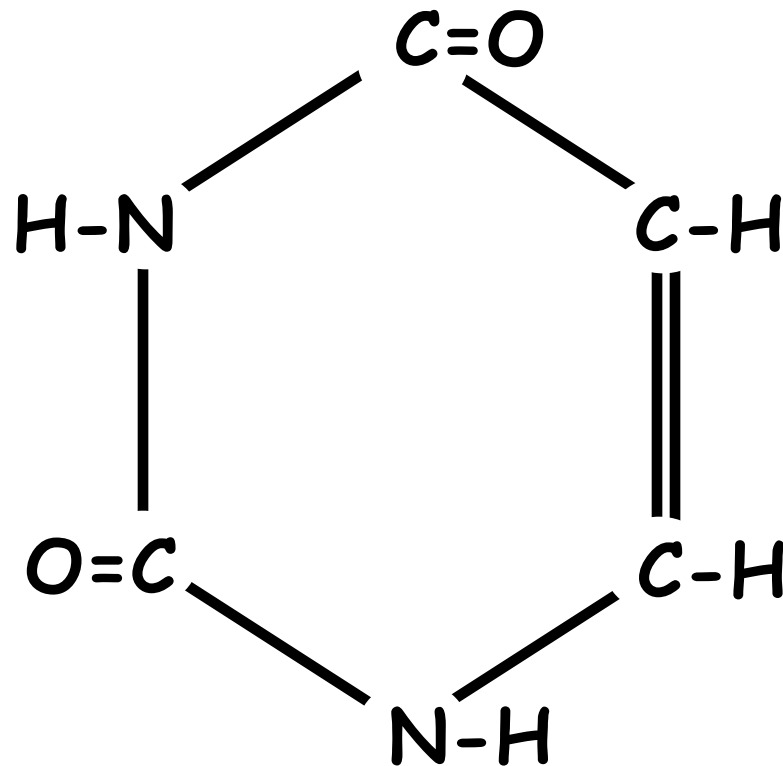
TIMINA



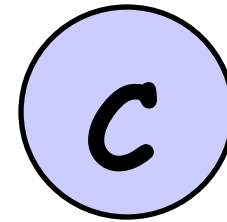
PIRIMIDINE



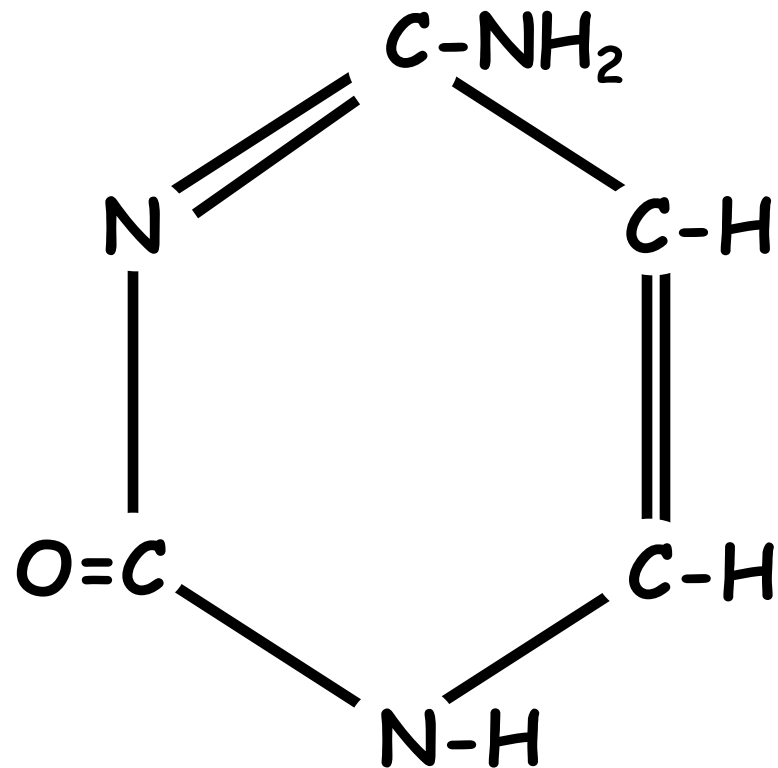
URACILE



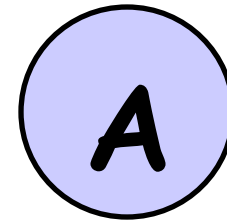
PIRIMIDINE



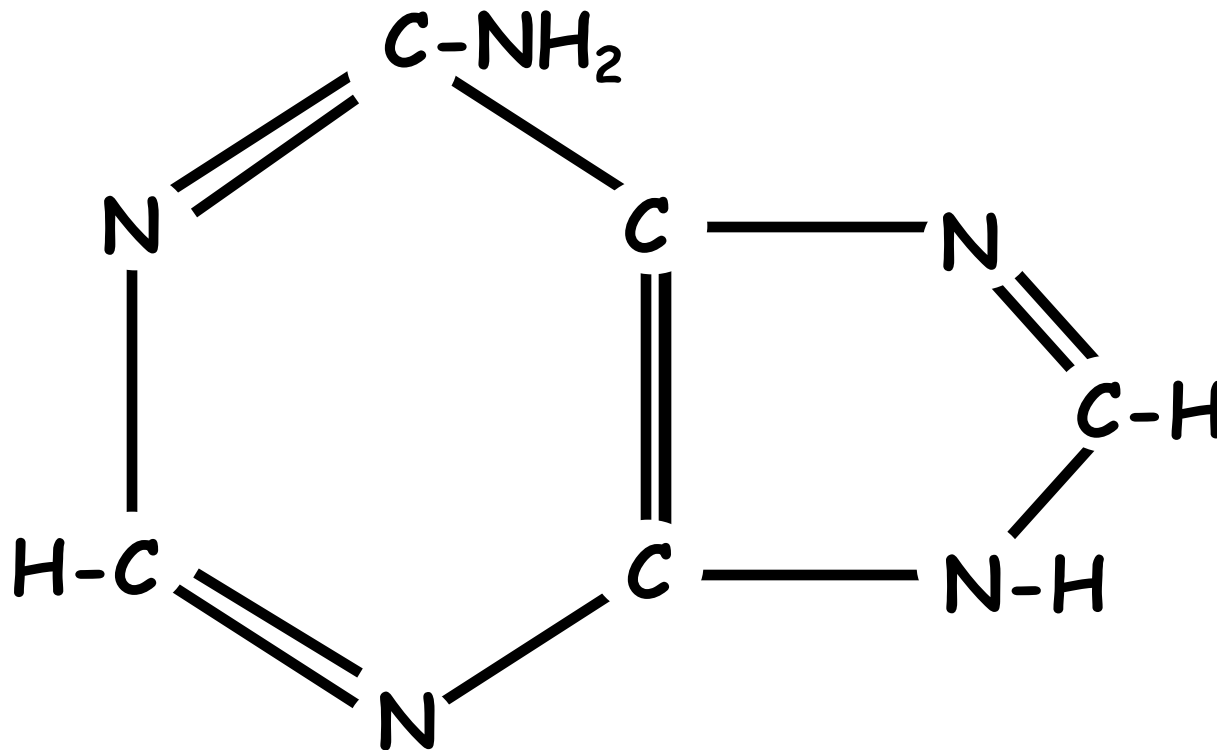
CITOSINA



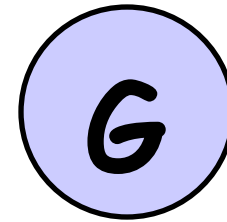
PURINE



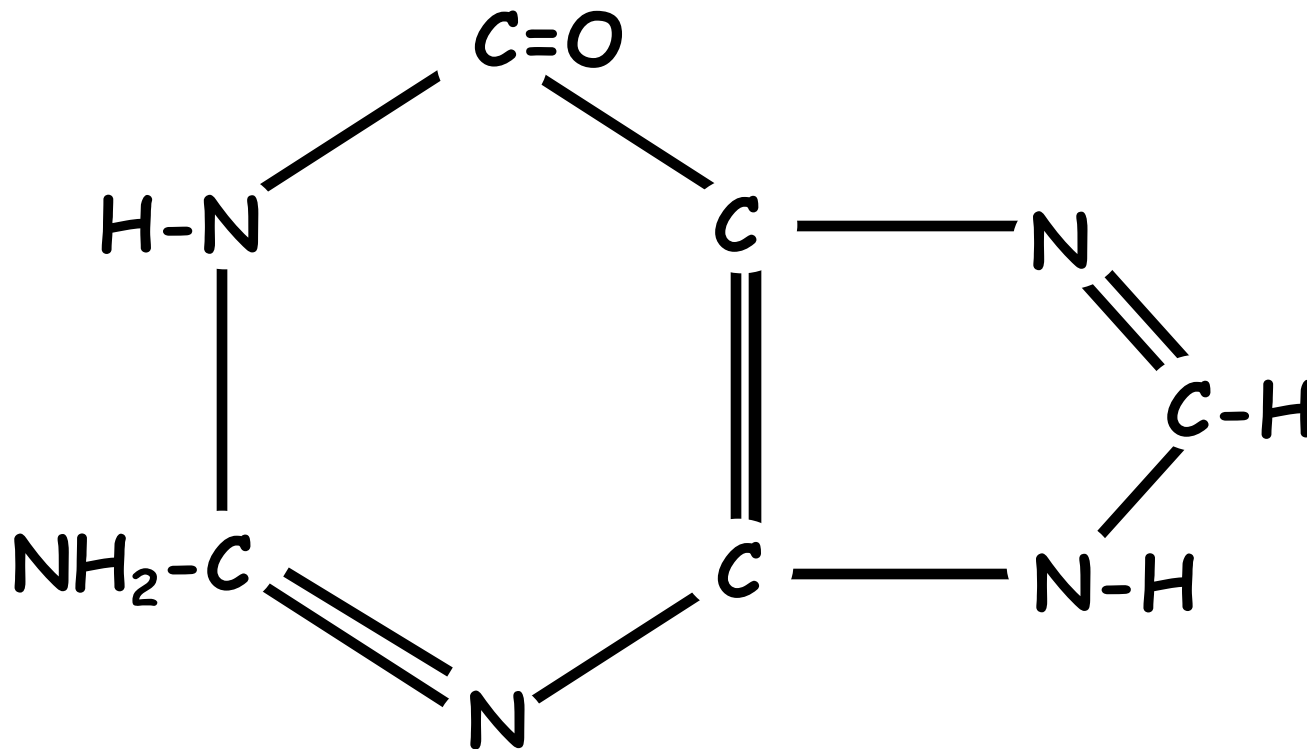
ADENINA



PURINE



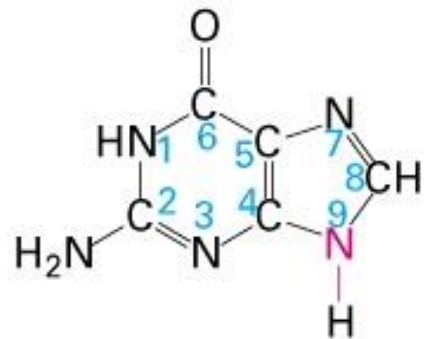
GUANINA



PURINES



Adenine (A)

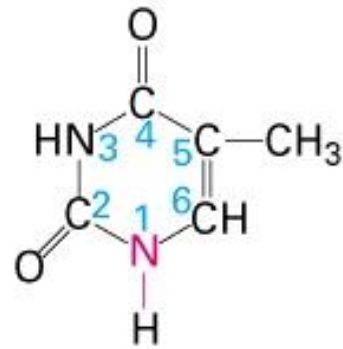


Guanine (G)

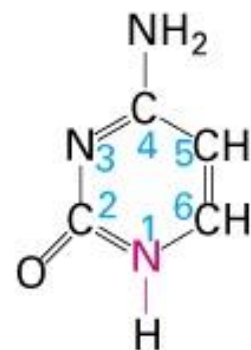
PYRIMIDINES



Uracil (U)



Thymine (T)



Cytosine (C)

CHARGAFF SCOPRI' IL RAPPORTO:

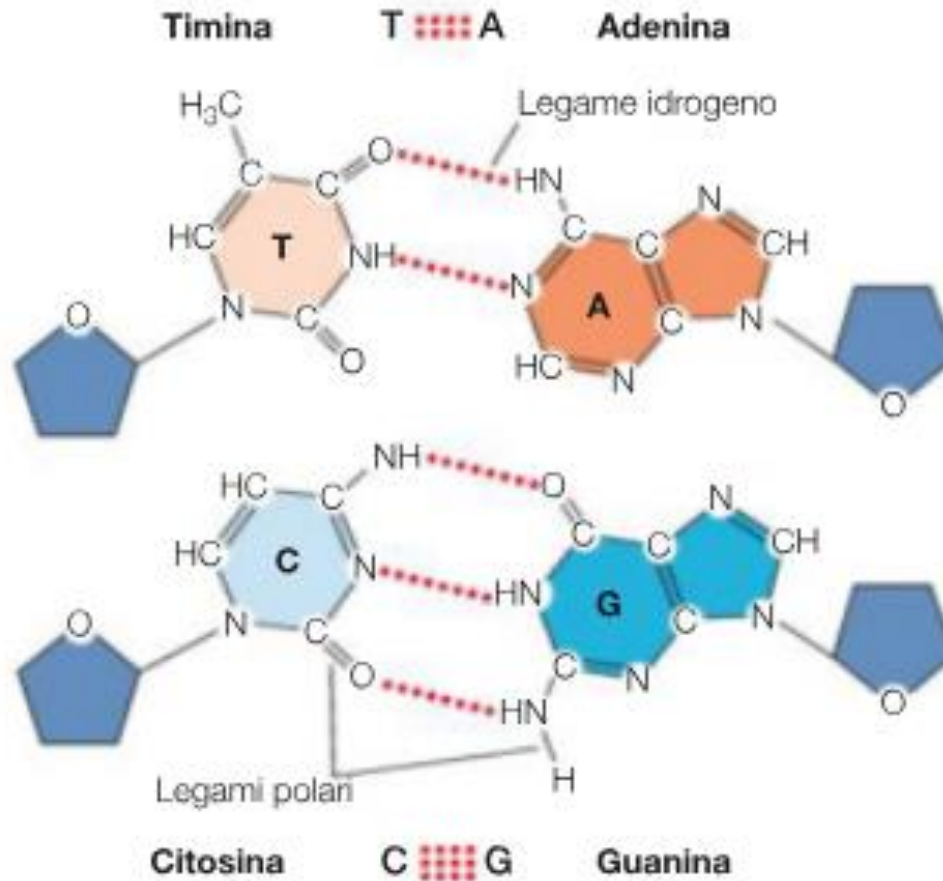
PURINE = PIRIMIDINE

$$A=T$$

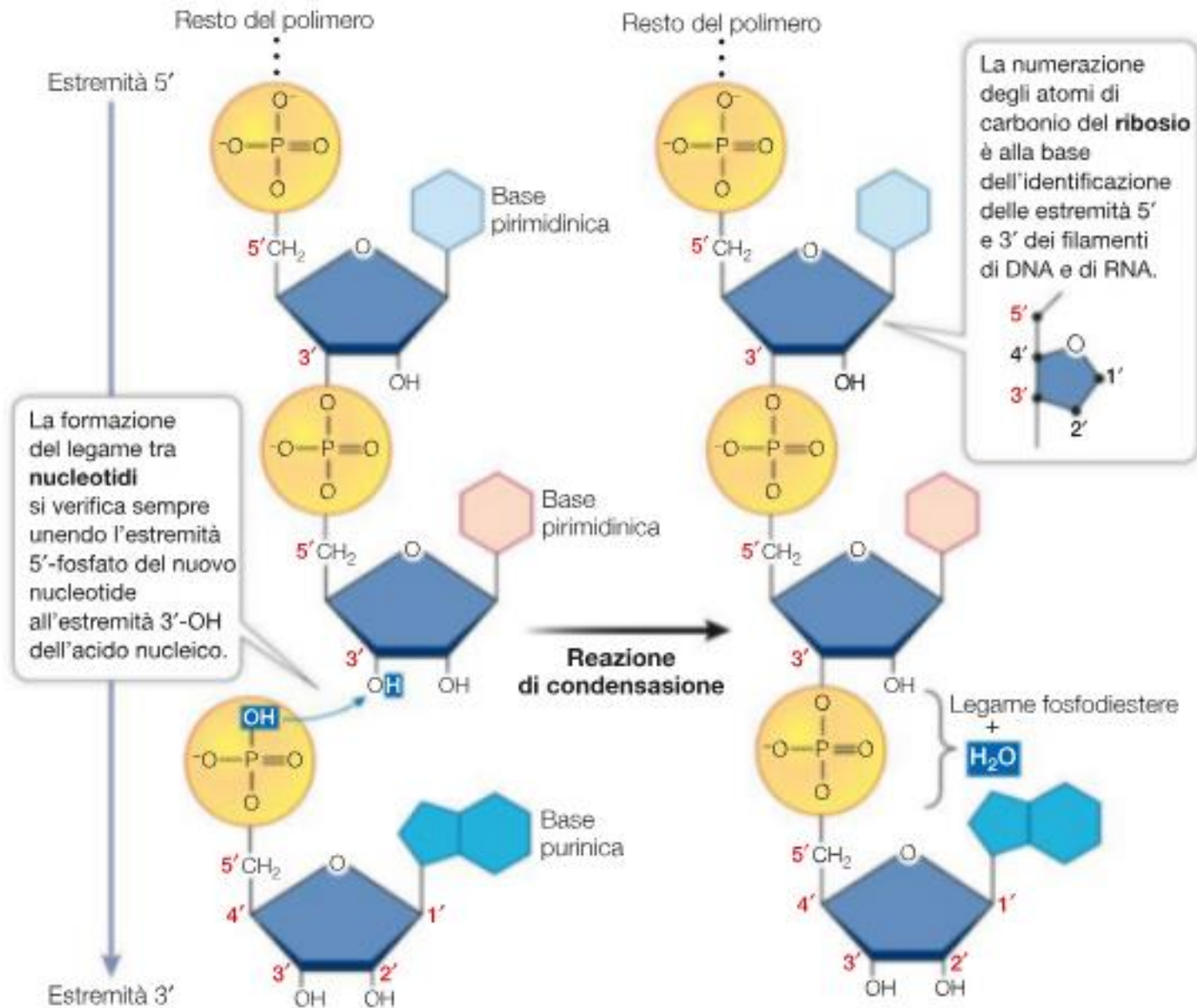
$$G=C$$

$$A+G = C+T$$

L'APPAIAMENTO COMPLEMENTARE DELLE BASI

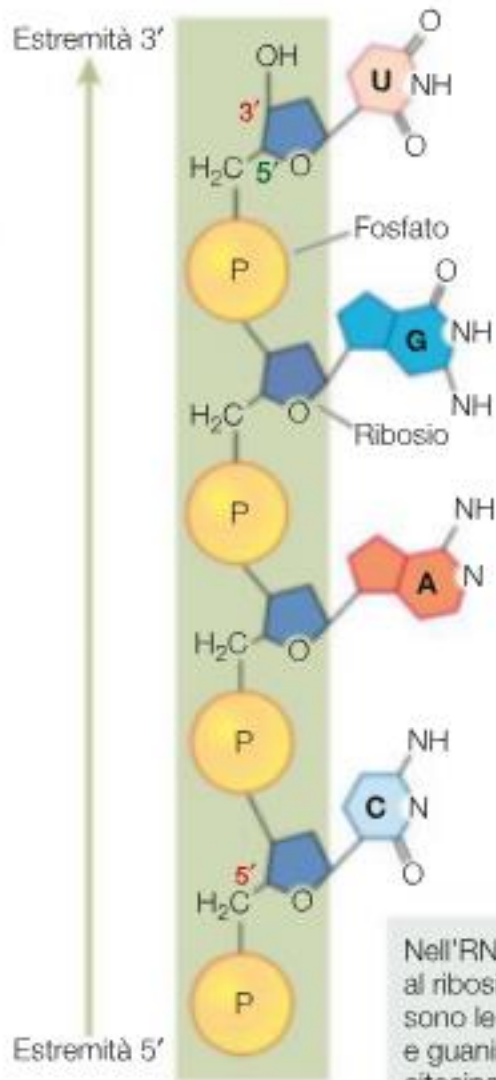


COME SI LEGANO TRA LORO GLI ACIDI NUCLEICI

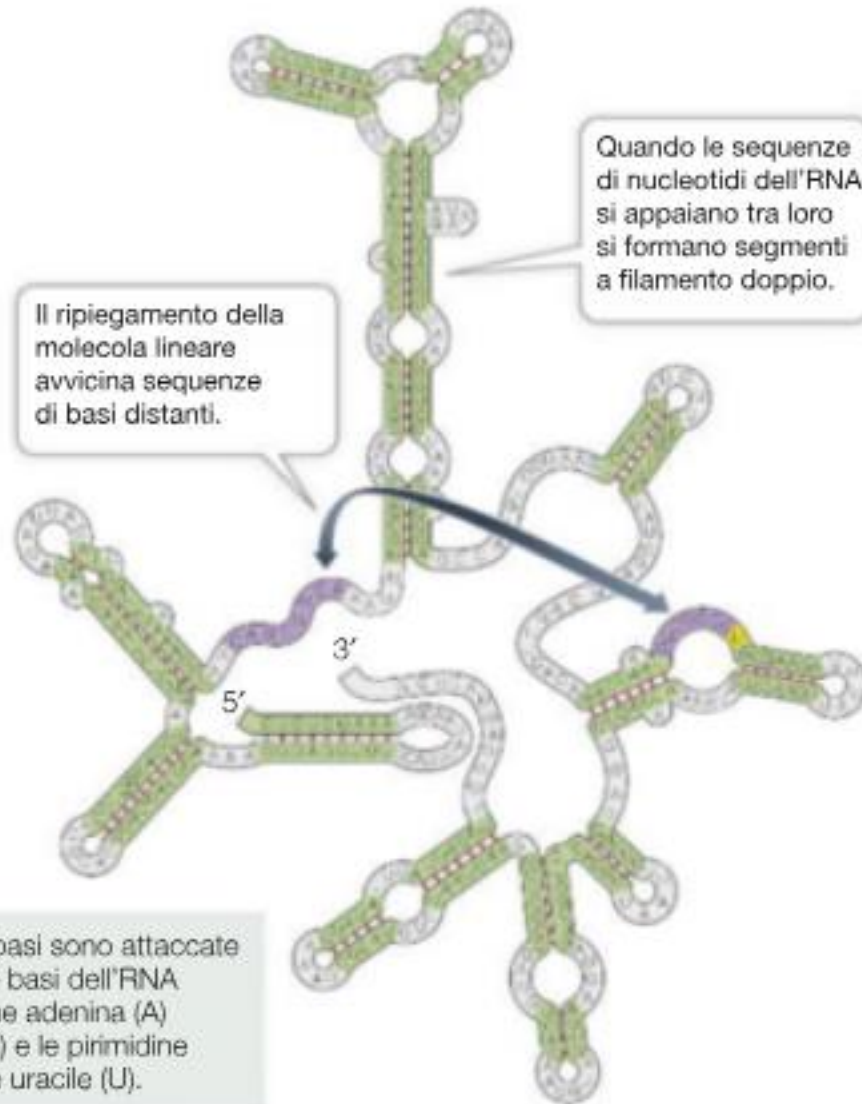


L'RNA

(A) RNA a singolo filamento

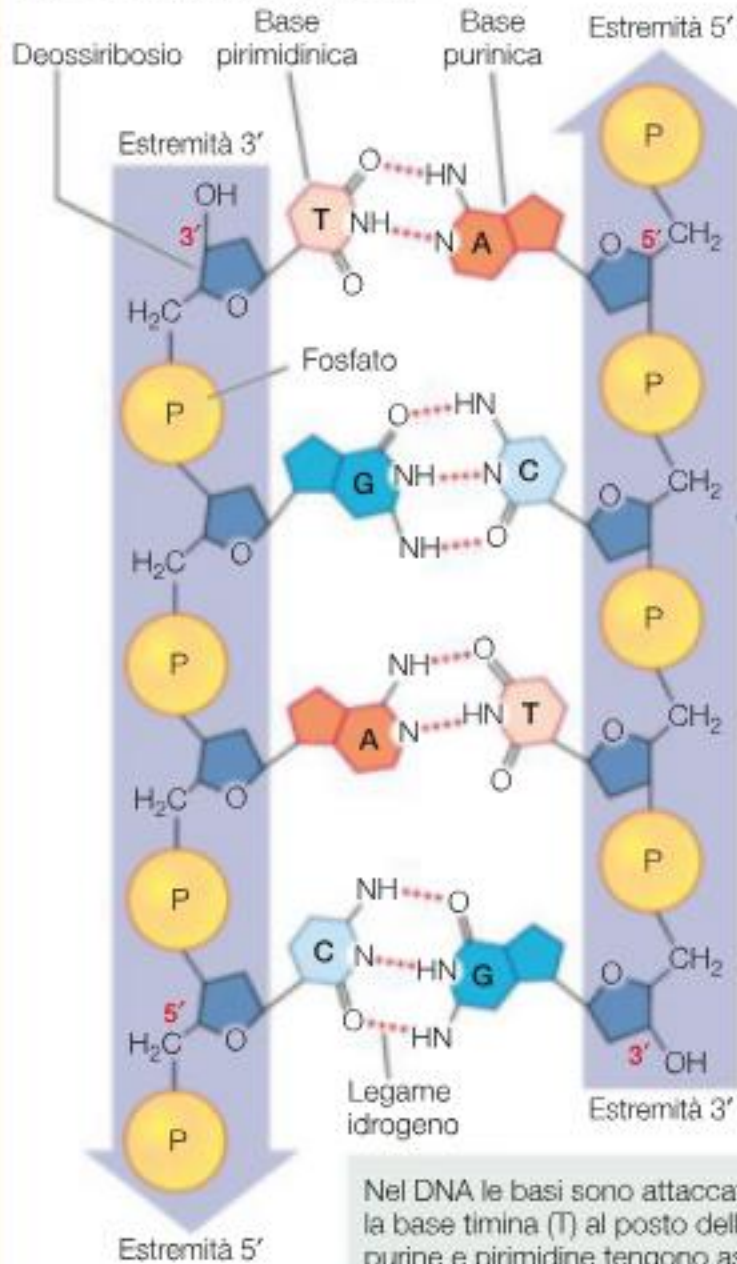


(B) Accoppiamento tra basi complementari di una singola molecola di RNA

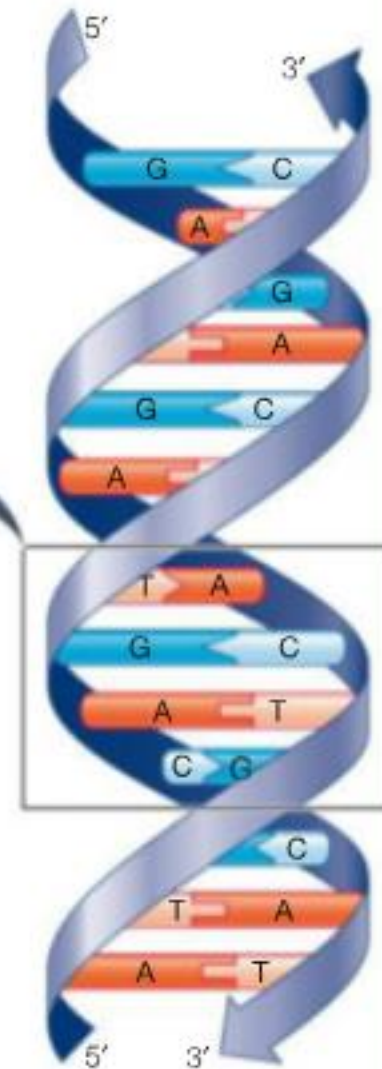


IL DNA

(A) DNA a filamento doppio



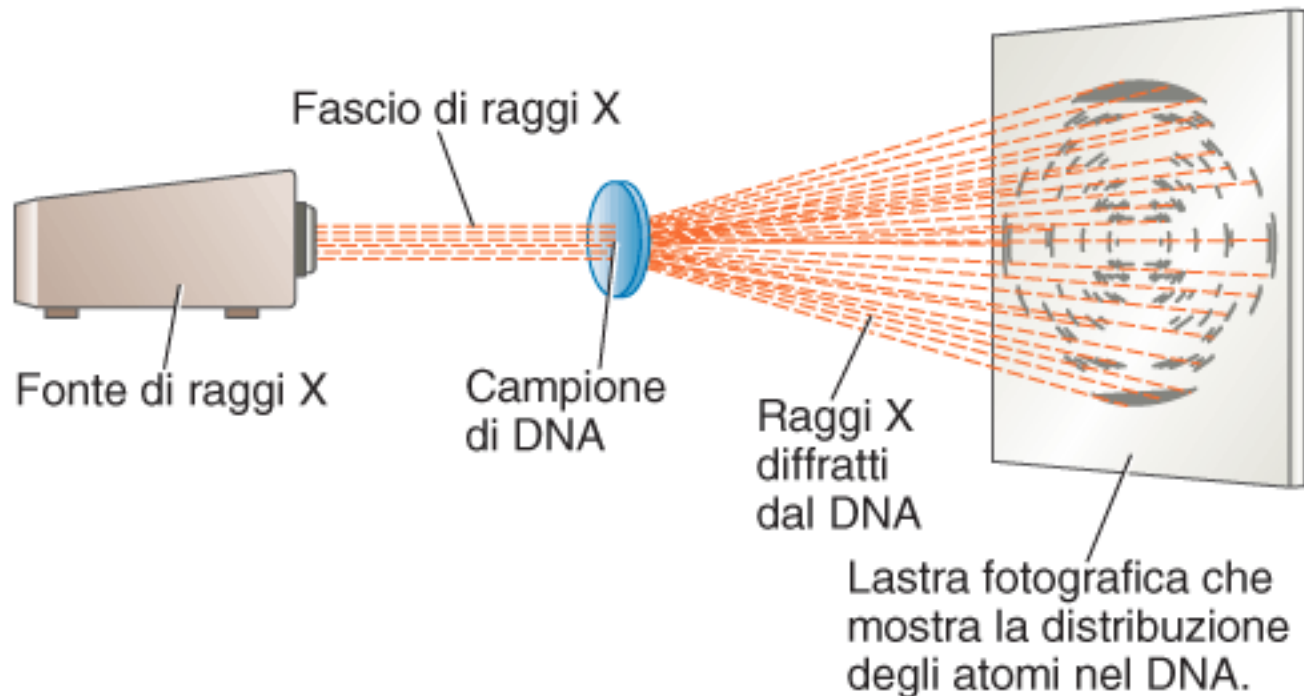
(B) La doppia elica del DNA



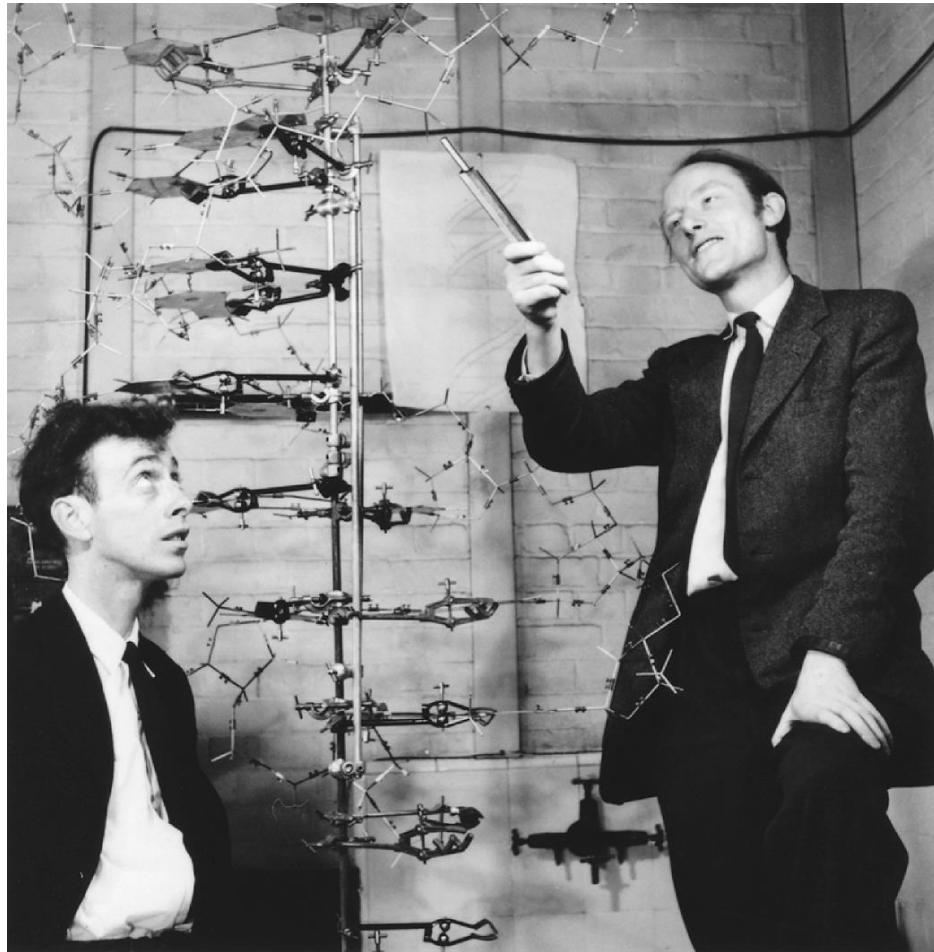
Nel DNA le basi sono attaccate al deossiribosio e vi si trova la base timina (T) al posto dell'uracile. I legami idrogeno tra purine e pirimidine tengono assieme i due filamenti di DNA.

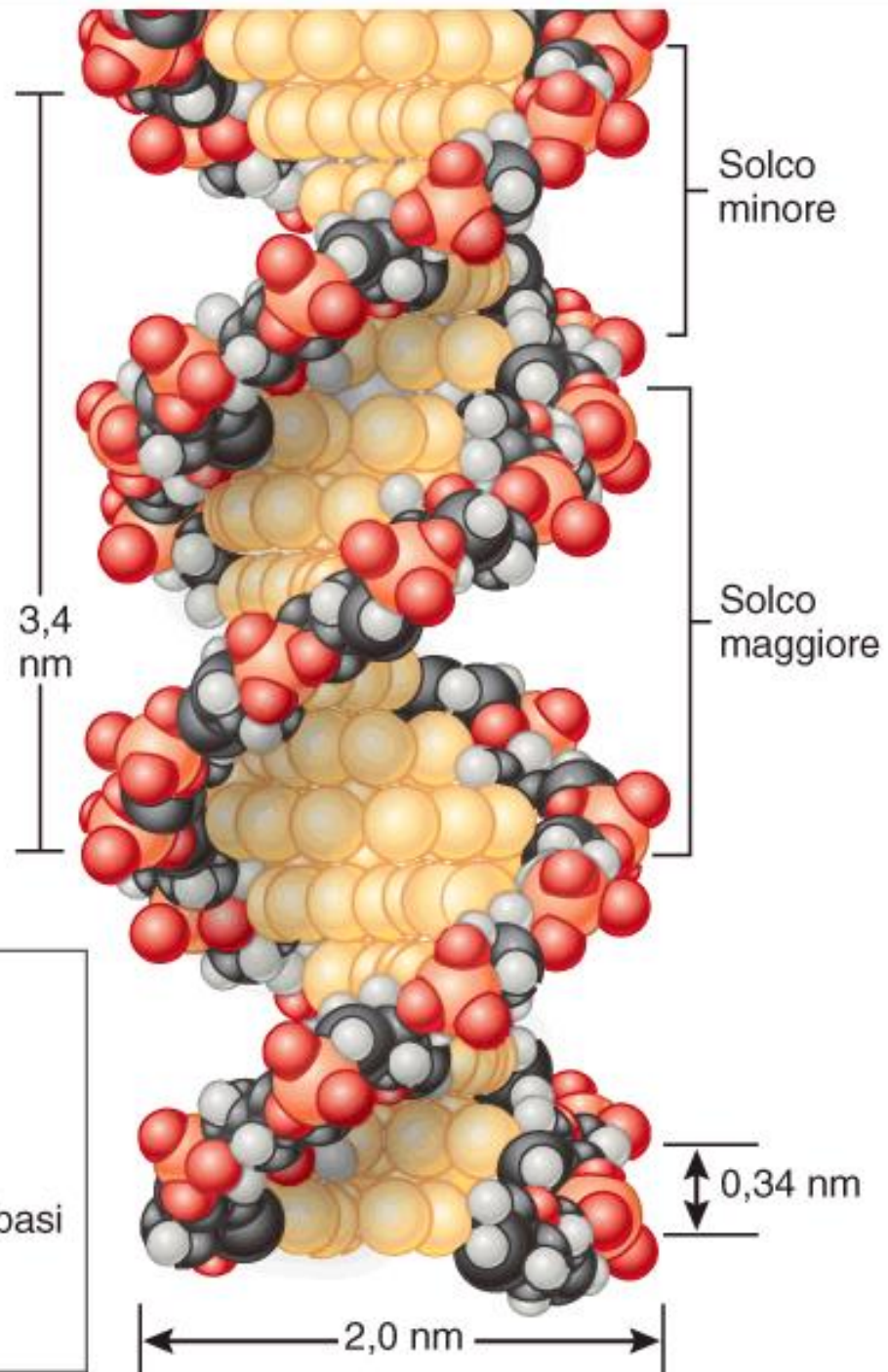
FRANKLIN E WILKINS STUDIARONO IL DNA
UTILIZZANDO LA:

CRISTALLOGRAFIA AI RAGGI X



WATSON E CRICK SCOPRIRONO CHE IL DNA HA
UNA STRUTTURA A: **DOPPIA ELICA**





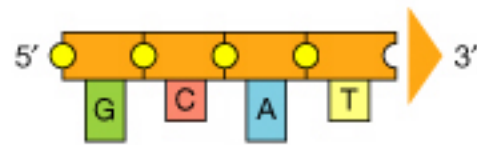
LEGENDA

- Idrogeno
- Ossigeno
- Carbonio
- Atomi nelle basi appaiate
- Fosforo

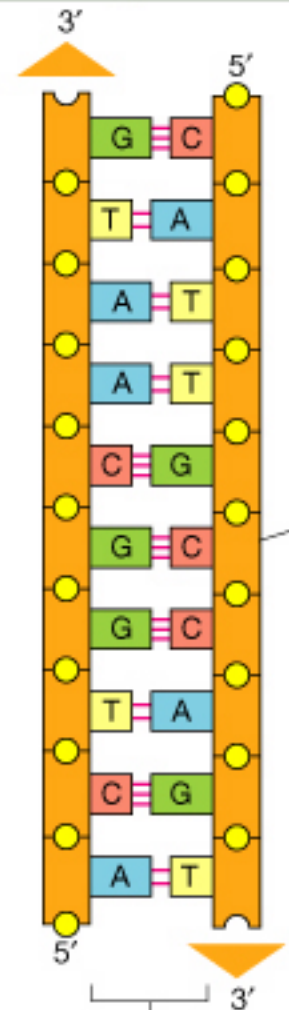
unità che compongono il DNA



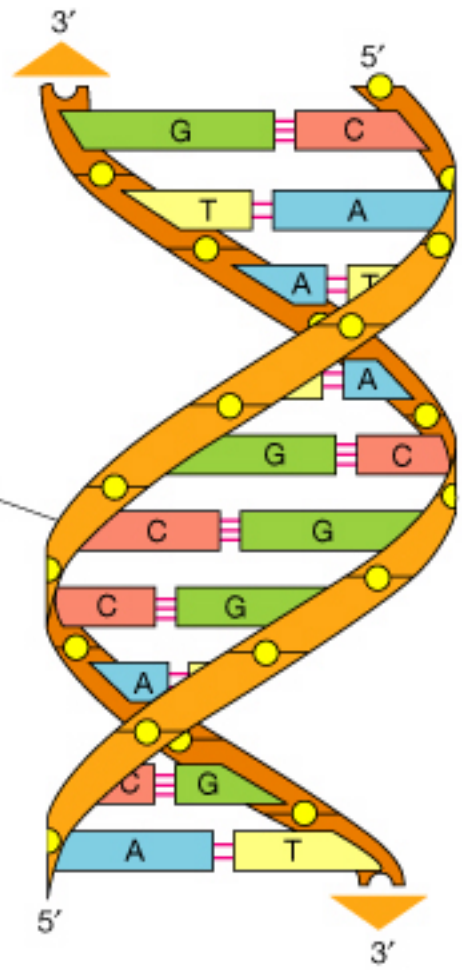
filamento di DNA



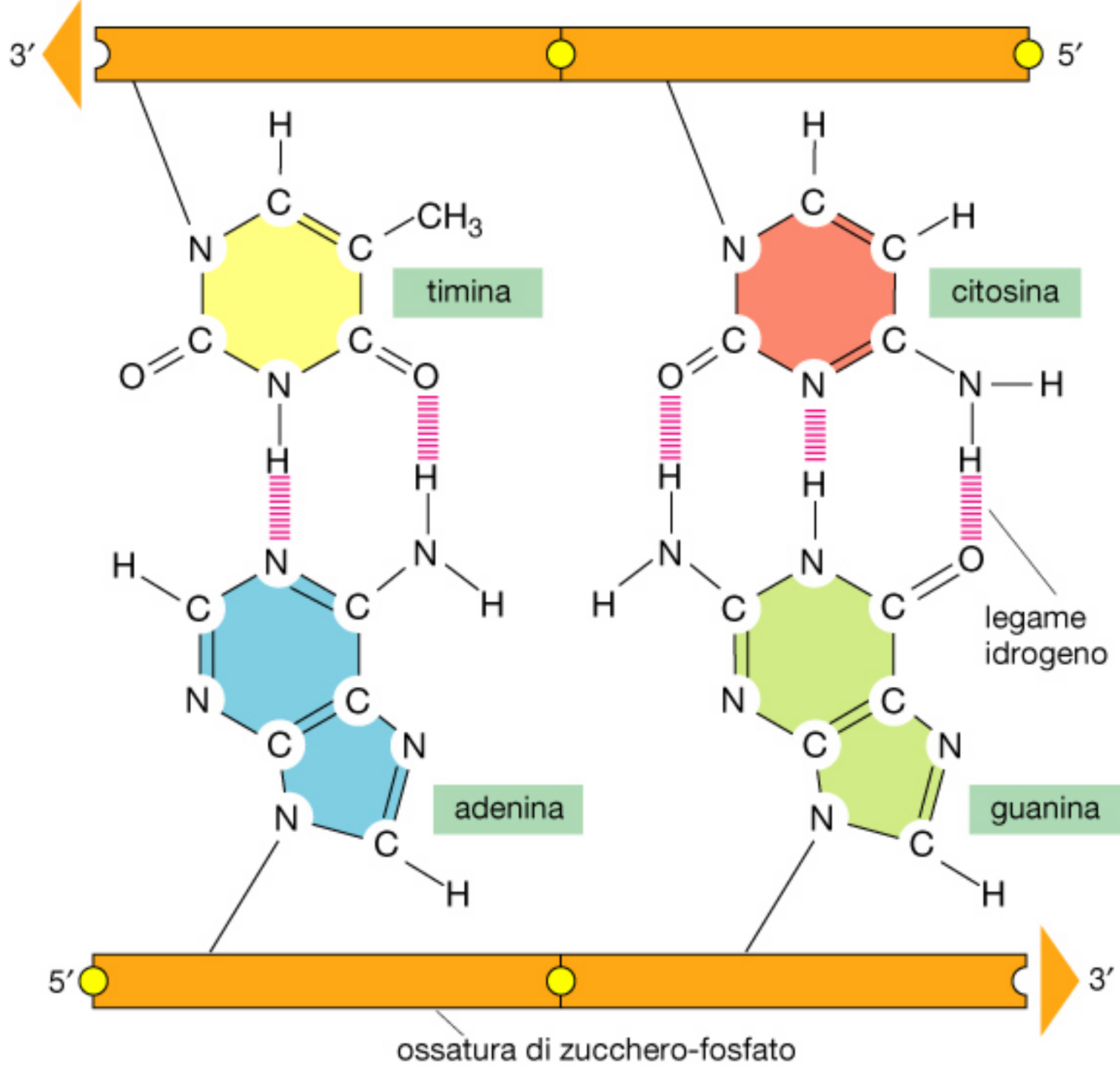
DNA a doppio filamento



doppia elica di DNA



coppie di basi legate da legami idrogeno

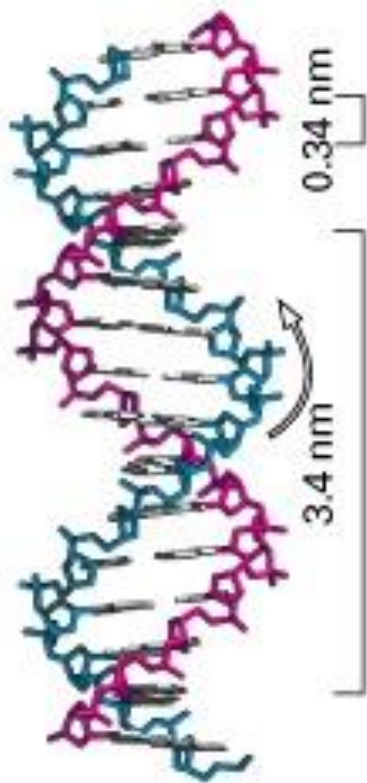


LA STRUTTURA DEL DNA

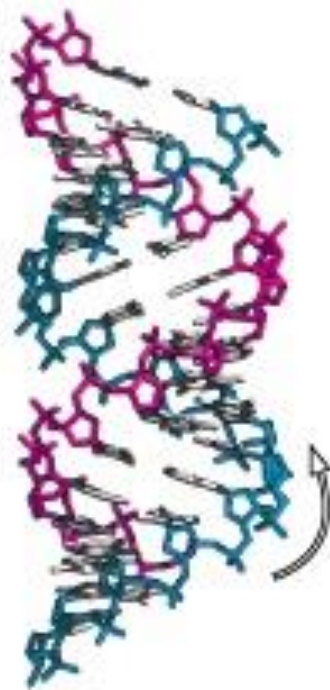
DNA B > configurazione più frequente
10 paia di basi per giro d'elica
una ogni 3.4 nm
solco maggiore molto ampio

DNA A > configurazione alternativa
più compatta della forma B
11 paia di basi per giro d'elica
2.3 nm - solco maggiore ridotto

(a) B DNA



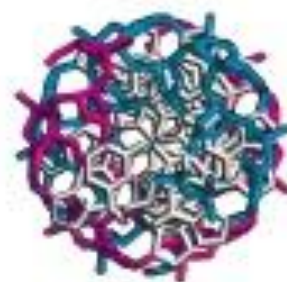
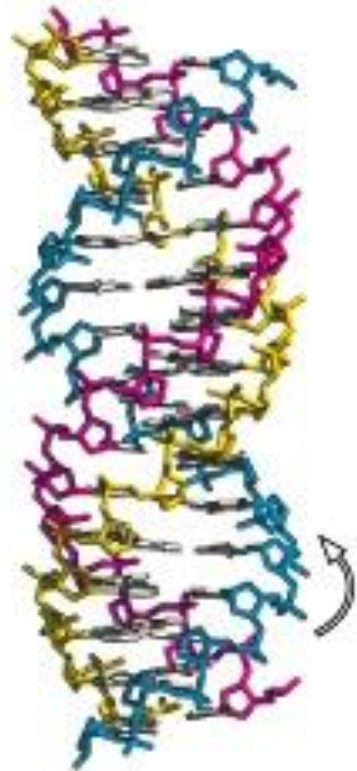
(b) A DNA



(c) Z DNA



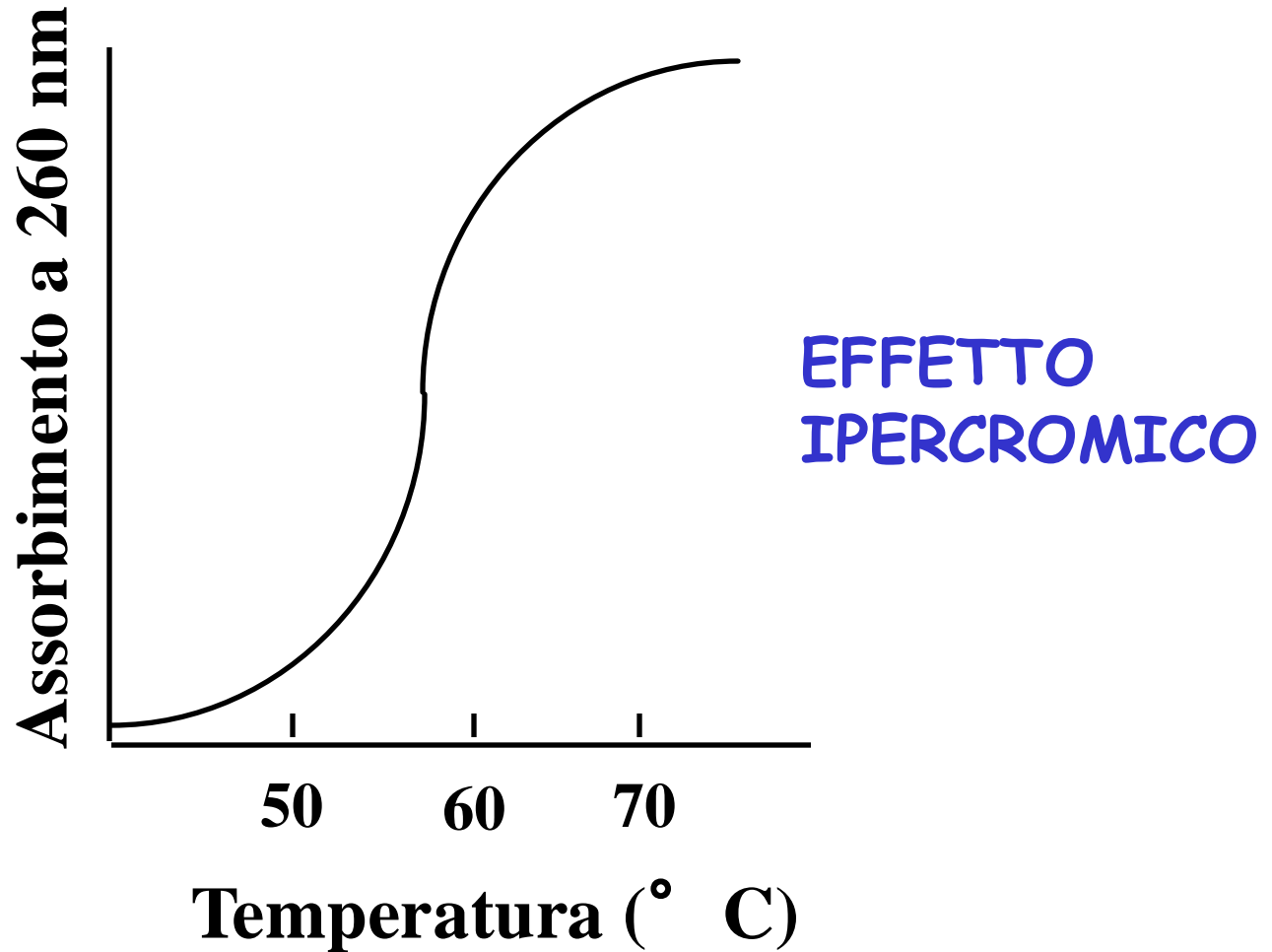
(d) Triple-Helical DNA



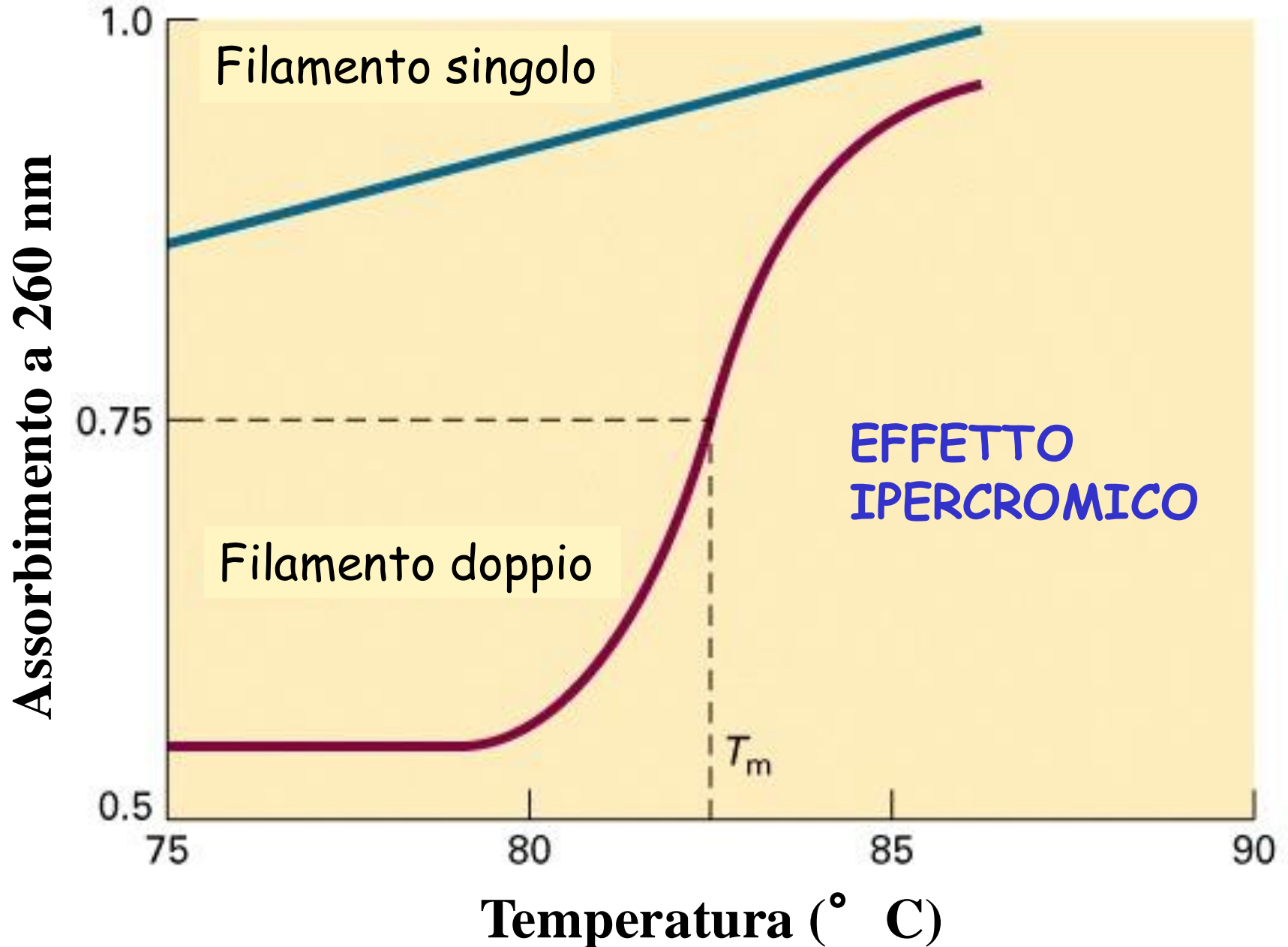
TRA LE PROPRIETA' FISICHE DEL DNA CHE SONO RILEVANTI RICORDIAMO:

viscosità'
sedimentazione
densità
denaturazione

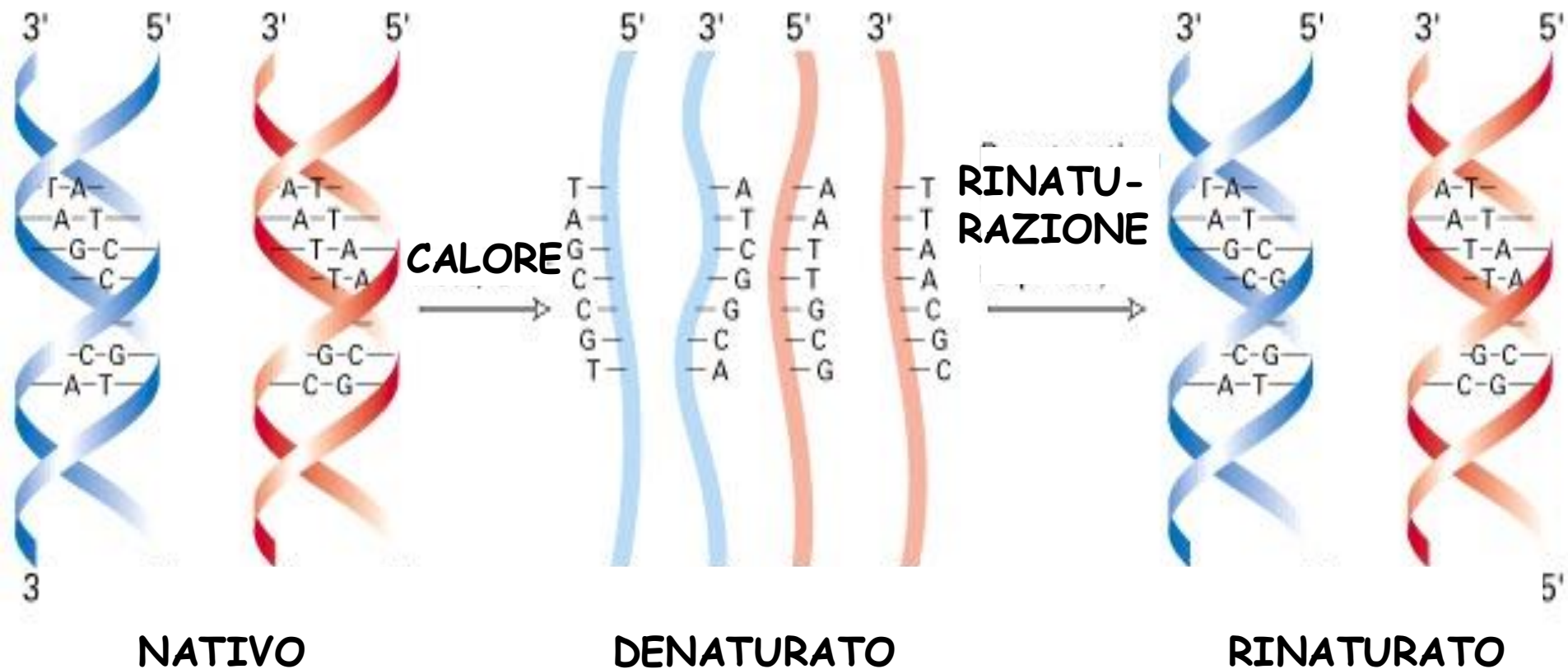
IL DNA PUO' ESSERE DENATURATO AL CALORE



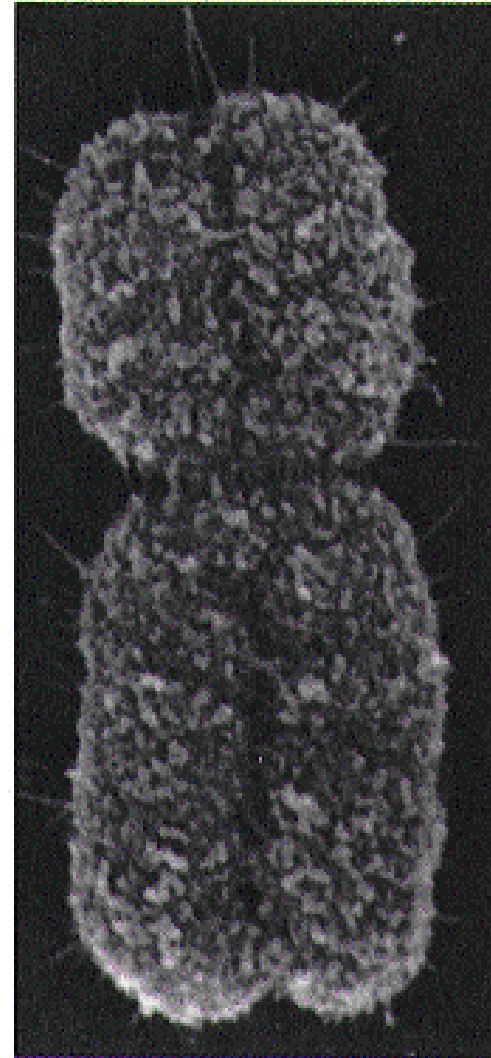
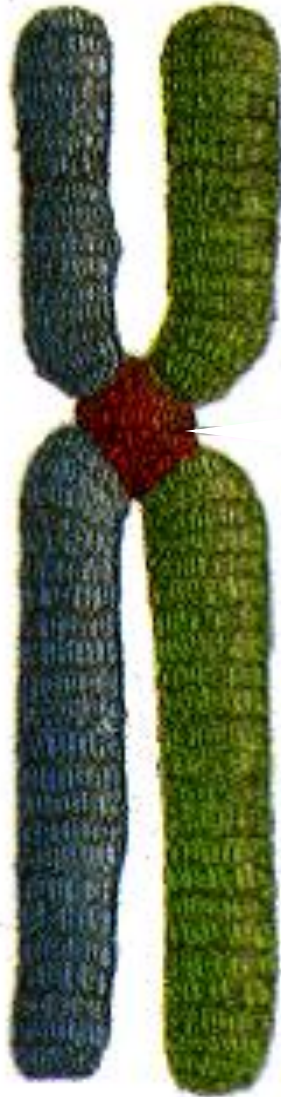
CINETICA DI DENATURAZIONE DEL DNA



LA RINATURAZIONE DEL DNA PORTA ALLA RICOSTITUZIONE DELLA DOPPIA ELICA

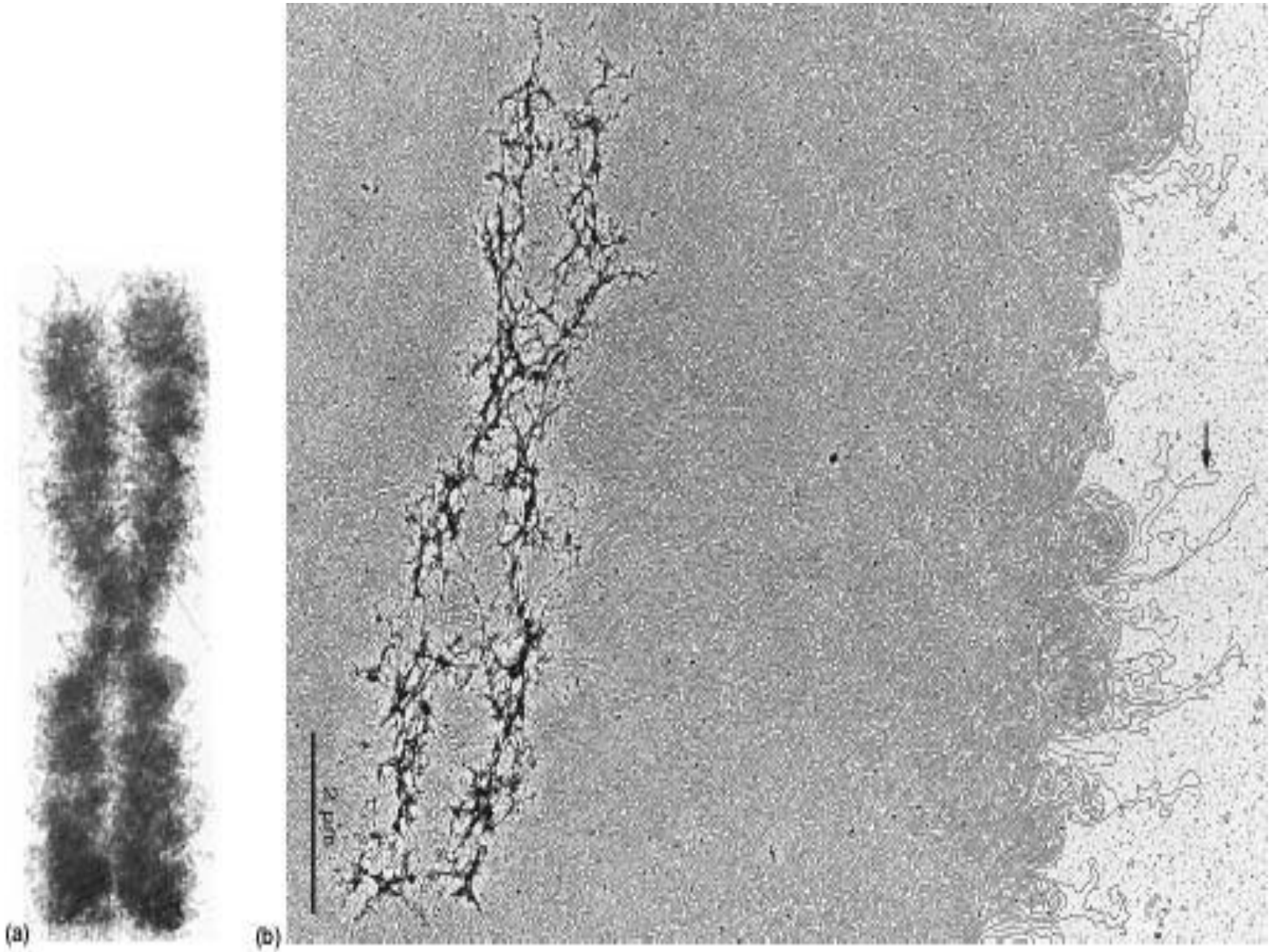


IL DNA EUCARIOTICO E' ORGANIZZATO IN CROMOSOMI



1 μm

NEL CROMOSOMA IL DNA E' FORTEMENTE RIPIEGATO



IL CROMOSOMA HA UNA ORGANIZZAZIONE ORDINATA

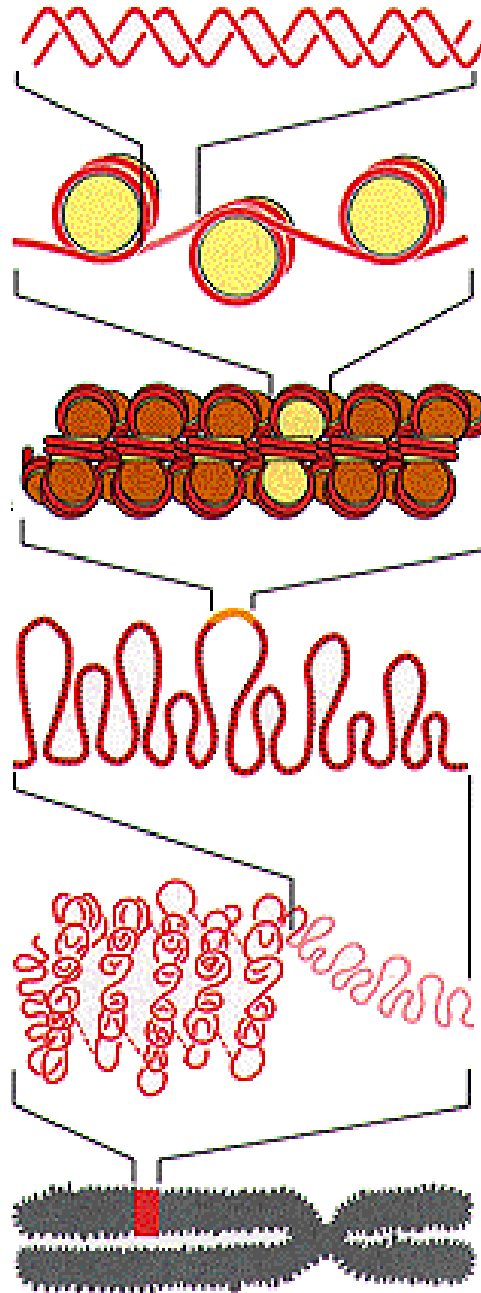
a
c
c
o
r
c
i
a
m
e
n
t
o

x 7

x 6

x 40

x 5



2 nm

11 nm

30 nm

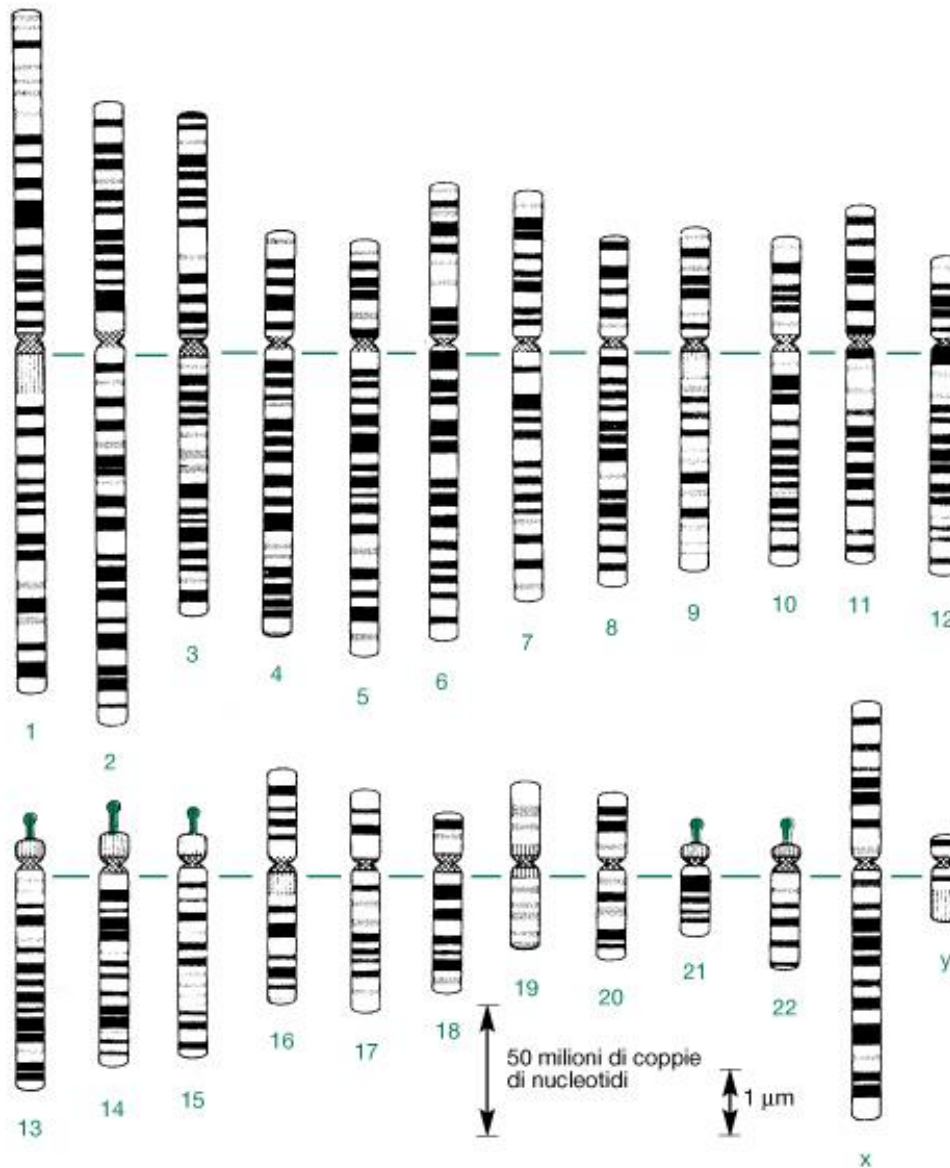
300 nm

700 nm

1400 nm

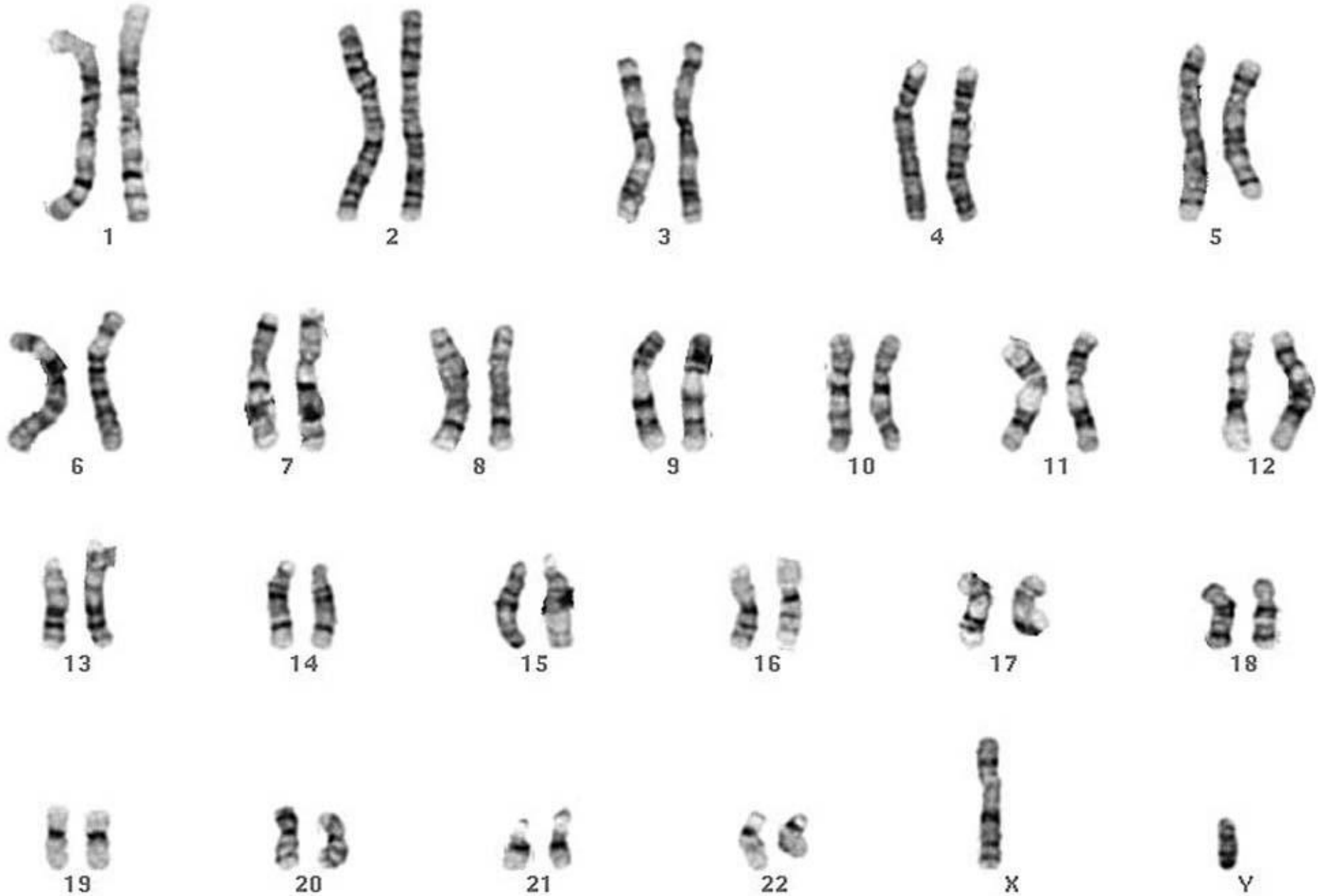
s
p
e
s
s
o
r
e

LA COLORAZIONE DEI CROMOSOMI E' A BANDE



Human male
G-bands

CARIOGRAMMA



PROPRIETA' DEL DNA SONO:

COMPLEMENTARIETA'

ANTIPARALLELISMO

INFORMAZIONI DERIVABILI DALLA STRUTTURA DEL DNA

MODALITA' DI REPLICAZIONE

NATURA DELL'INFORMAZIONE

**NEL DNA E' CONTENUTA INFORMAZIONE
SULLA STRUTTURA DELLE PROTEINE**

**L'INFORMAZIONE E' TRASCRIITTA IN mRNA
E POI TRADOTTA IN PROTEINE**

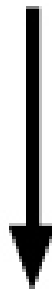
gene A

gene B

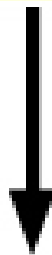
gene C



doppia
elica del
DNA



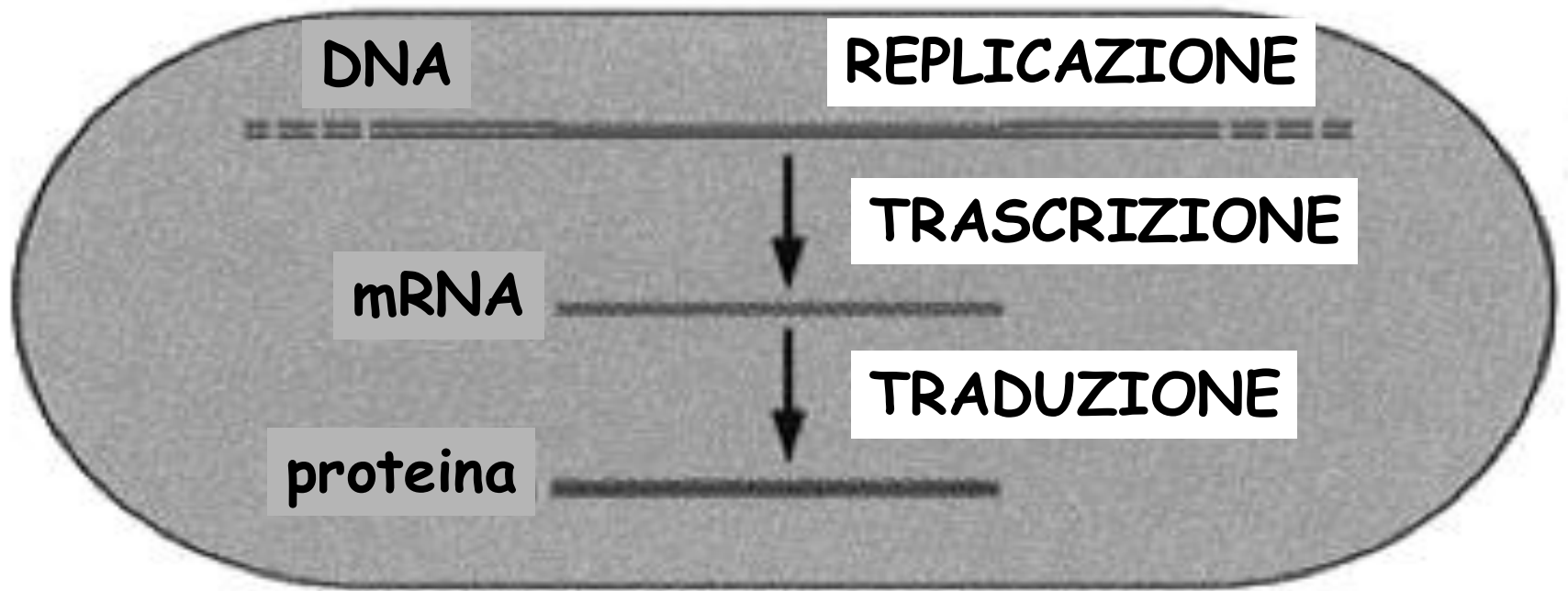
espressione dei geni



proteina A

proteina B

proteina C



**L' INFORMAZIONE E' IN CODICE:
AD OGNI TRIPLETTA DI NUCLEOTIDI
CORRISPONDE UN AMMINOACIDO**

1st position (5' end) ↓	2nd position				3rd position (3' end) ↓
	U	C	A	G	
U	Phe Phe Leu Leu	Ser Ser Ser Ser	Tyr Tyr STOP STOP	Cys Cys STOP Trp	U C A G
C	Leu Leu Leu Leu	Pro Pro Pro Pro	His His Gln Gln	Arg Arg Arg Arg	U C A G
A	Ile Ile Ile Met	Thr Thr Thr Thr	Asn Asn Lys Lys	Ser Ser Arg Arg	U C A G
G	Val Val Val Val	Ala Ala Ala Ala	Asp Asp Glu Glu	Gly Gly Gly Gly	U C A G