

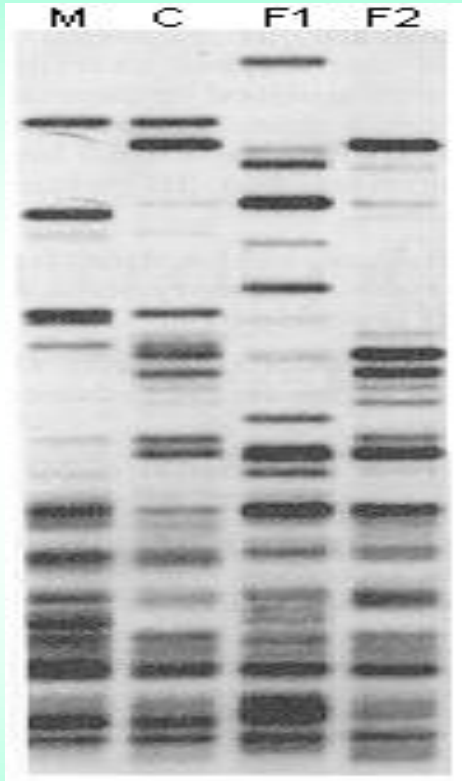
# MATERI GENETIK II :DNA-RNA

## Struktur kromosom:

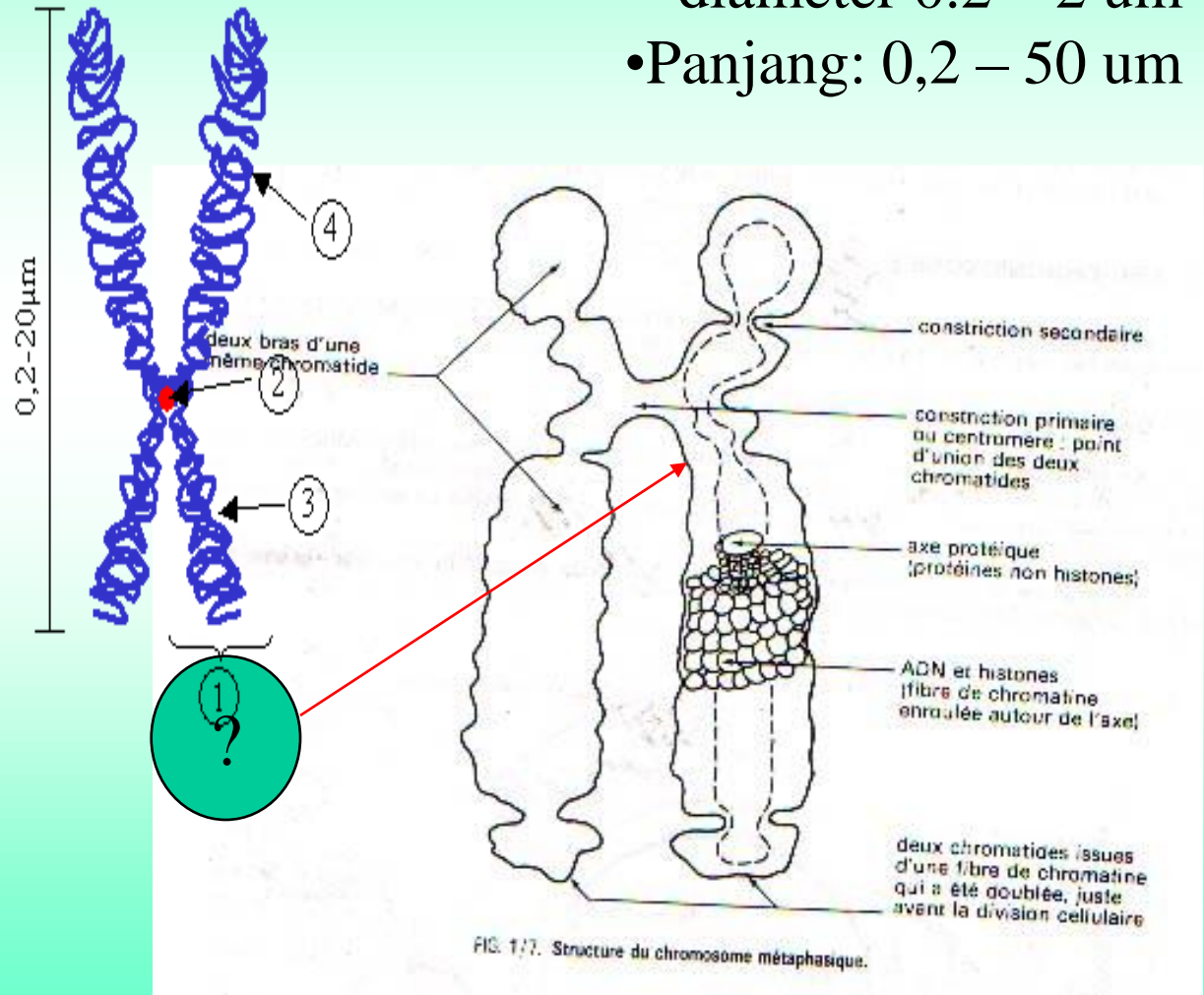
Ukuran :

- diameter 0.2 – 2  $\mu\text{m}$
- Panjang: 0,2 – 50  $\mu\text{m}$

## PATERNITY TEST



M = ibu  
F = bapak (1)  
F2 = bapak (2)  
C = anak



# Gen dan Kromosom

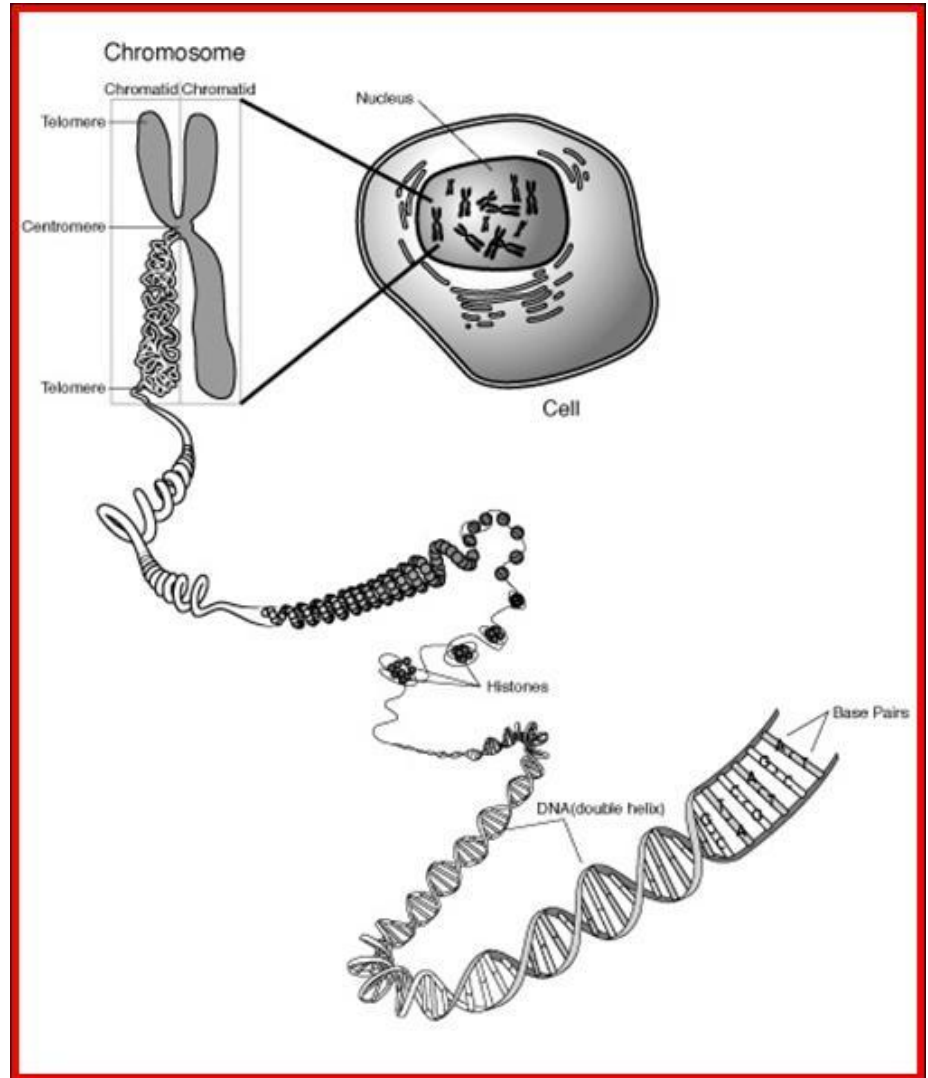
Kromosom terletak didalam inti sel berbentuk serabut yang disebut benang kromatin.

Setiap kromosom mengandung rantai DNA.

Potongan pendek DNA disebut gen.

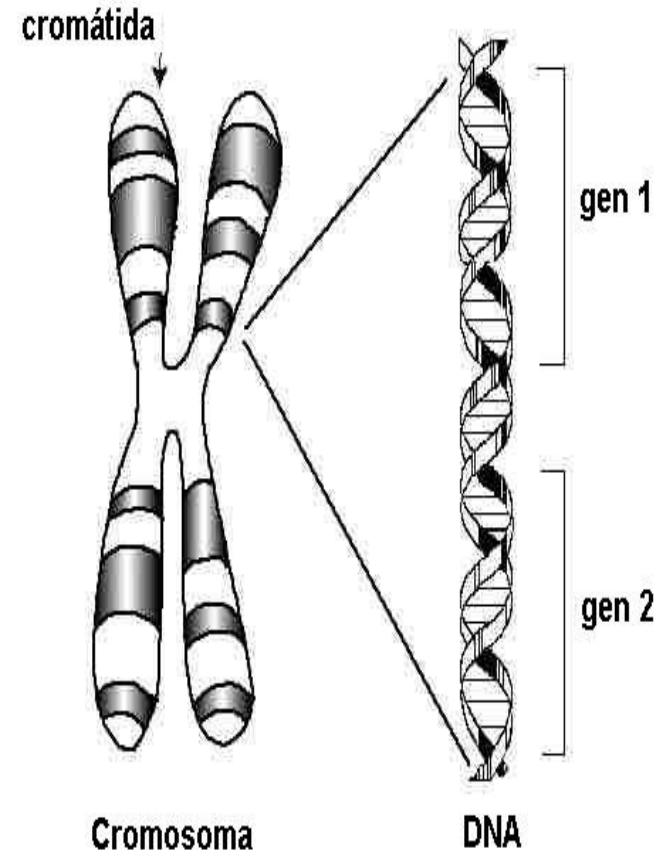
Gen inilah yang membawa sifat keturunan

Setiap gen menempati tempat tertentu didalam kromosom yang disebut lokus gen



# DNA memiliki beberapa fungsi yaitu :

- a) Sebagai pembawa informasi genetik dari satu generasi ke generasi lainnya
- b) Mengontrol aktifitas dalam sel, baik secara langsung maupun tidak langsung
- c) Menentukan proses pembentukan protein (sintesis protein)
- d) Membentuk RNA



# PROSES ISOLASI DNA

Secara Umum:

(1). Kromosom dikeluarkan dari nukleus

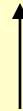
(2). Inti Sel (nukleus) t.a. DNA,

PROTEIN(histone), RNA

(Bahan utama pembentuk kromosom)

ditambahkan RNA ase -----→ DNA + Protein

(3). DNA + Protein -----→ DNA saja



(enzim proteinase)

# DNA is a macromolecule

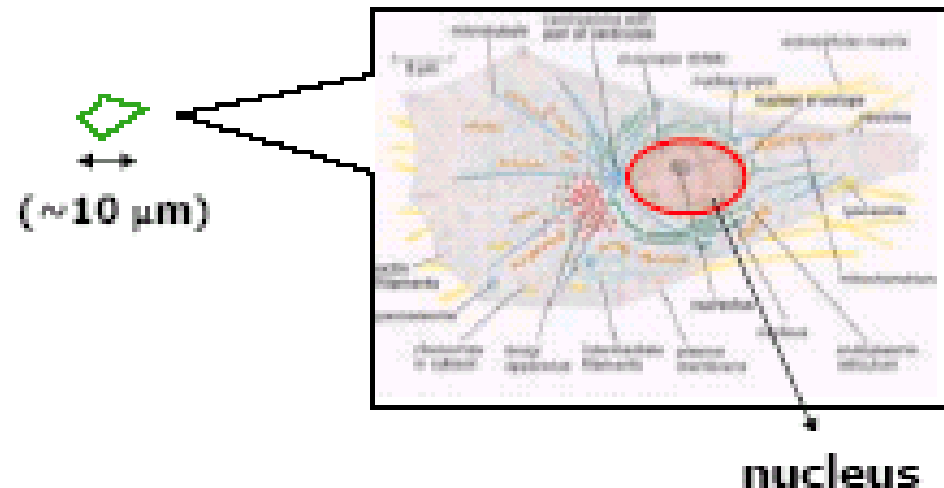
**Genome: the totality of genetic information belonging to an organism**

Human genome:  $3 \times 10^9$  nucleotides

**DNA:**



**Cell:**



Fragmentation

→ **chromosome**

Packaging with the help of protein (histone)

→ **nucleosome structure**

Kromosom ta: protein dan asam nukleat

Asam nukleat ta unit2 nukleotida

Nukleutida ta: 3 mcm molekul utama

(1).gula: a. Deoxy (DNA)

b. Ribose (RNA)

(2). Gusus Phospat

(3). BASA NITROGEN

Cat: 1 dan 2 identik pd semua sel  
3 berbeda antar sel

**(3). BASA NITROGEN :**

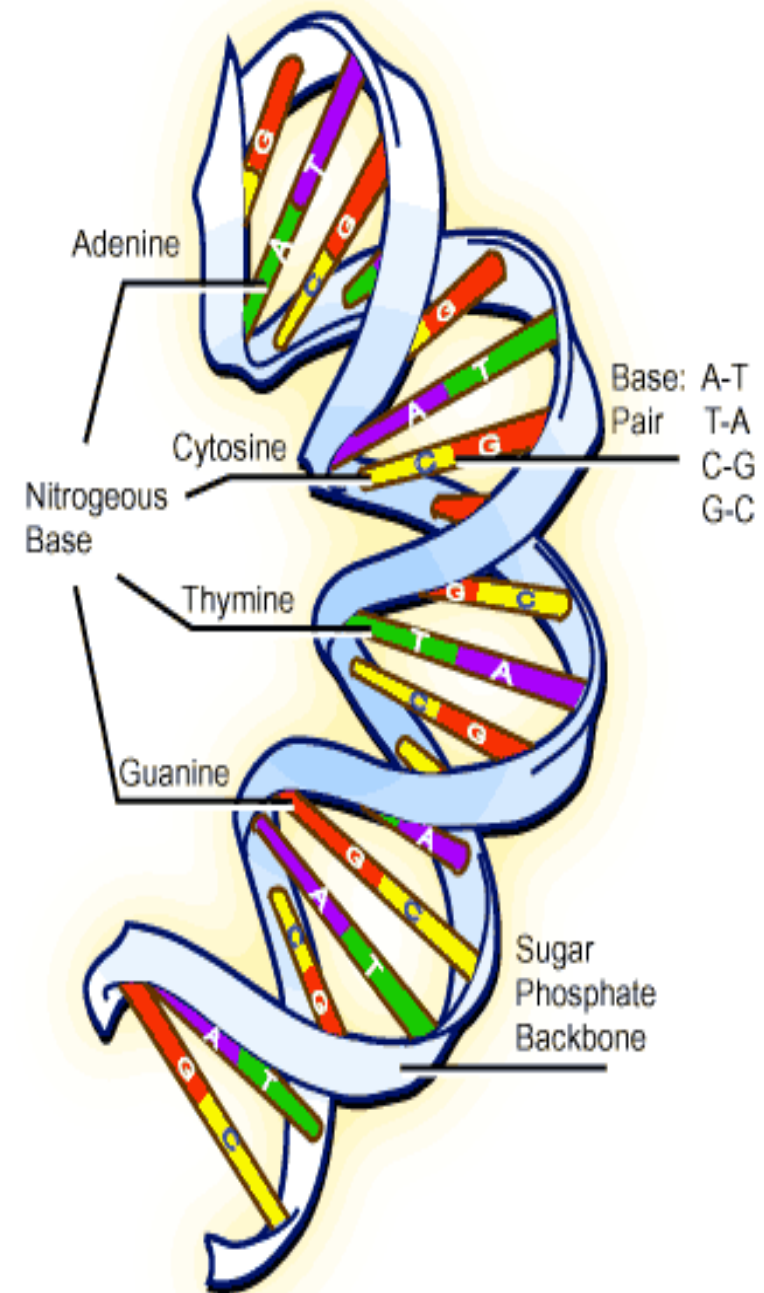
**Purine :** Adenin (A); Guanin (G).

**Pyrimidine :** (Cystine (C) ; Uracyl (U) dan Thymin (T):

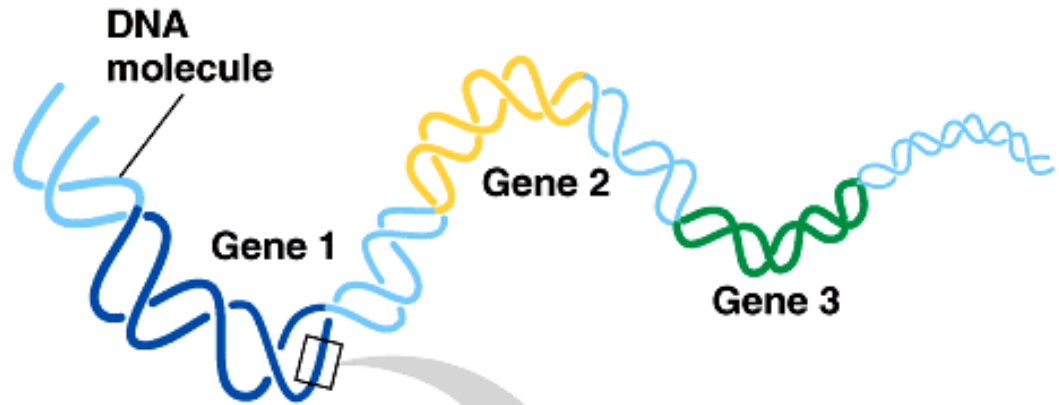
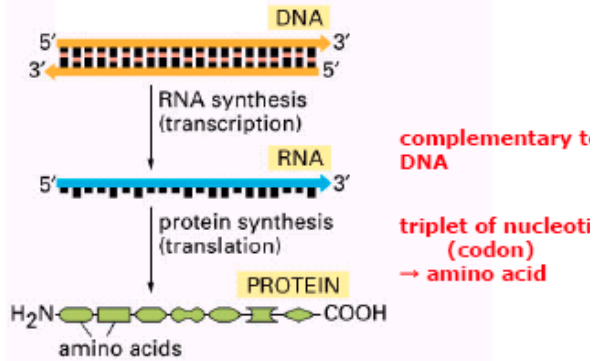
Pasangan : A-T; C-G

DNA : C.T

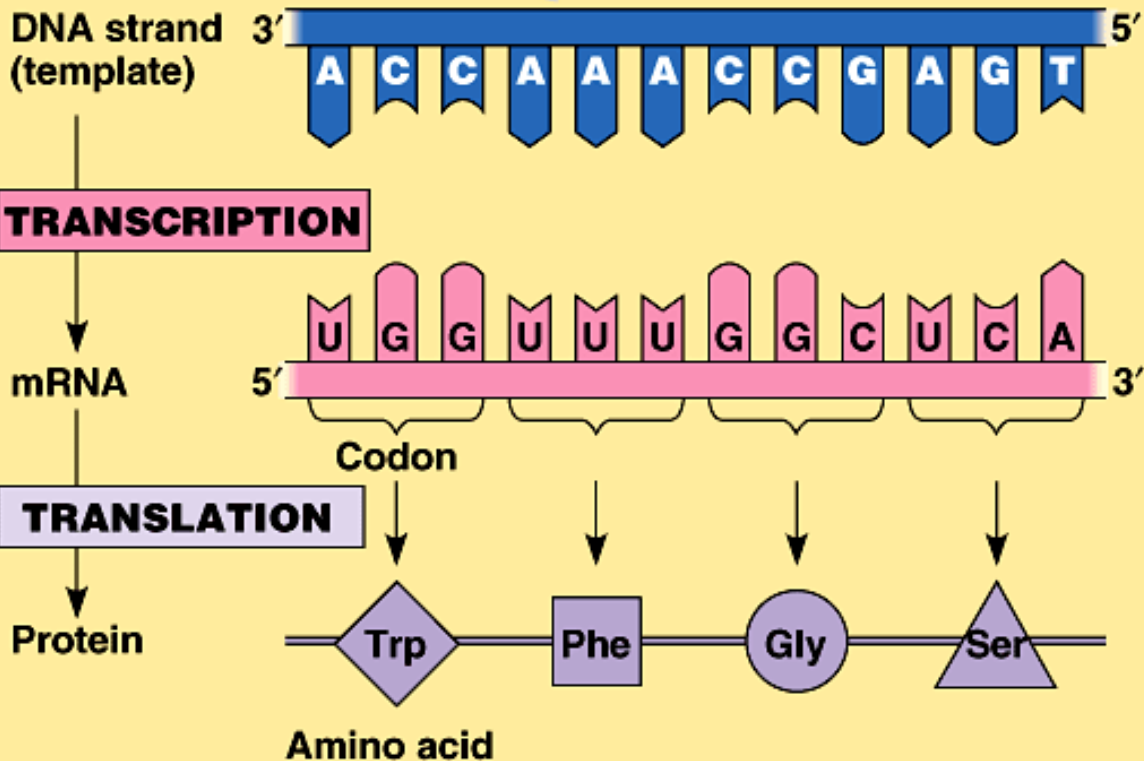
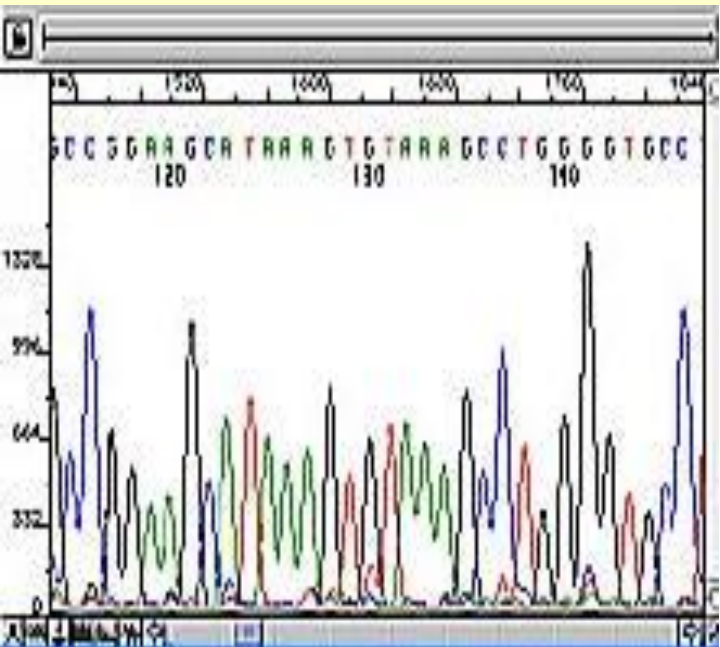
RNA : C.U



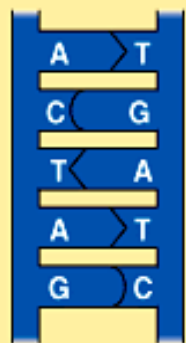
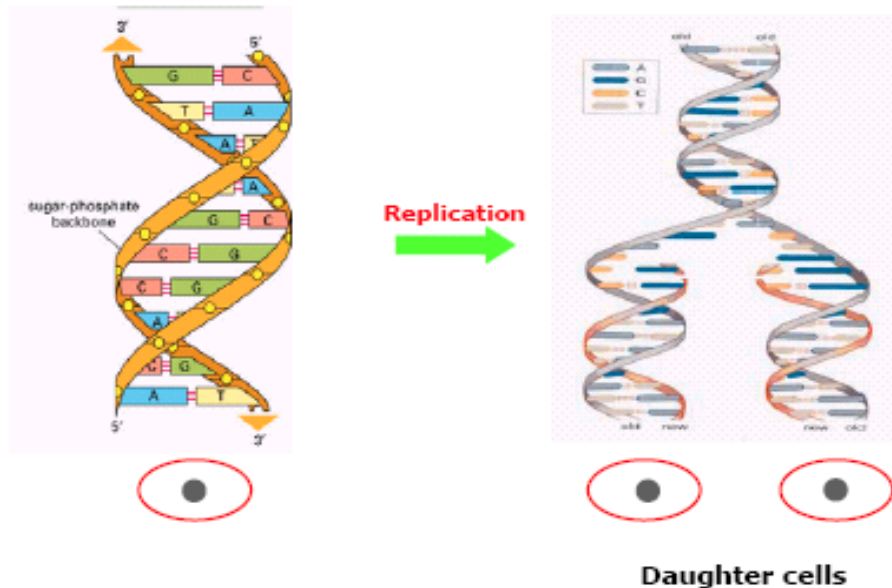
## Gene: functional unit of genome



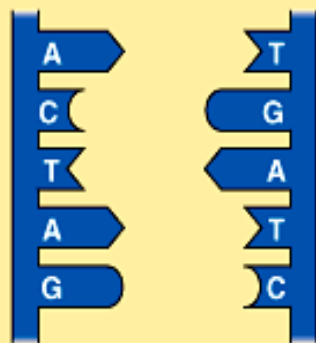
Sekuen: merunut nukleotida penyusun rangkaian molekul DNA



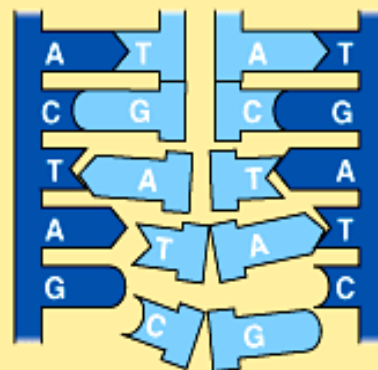
## Principles of DNA structure (2): double helix



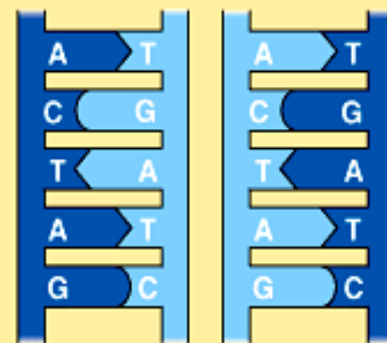
(a) The parent molecule has two complementary strands of DNA. Each base is paired by hydrogen bonding with its specific partner, A with T and G with C.



(b) The first step in replication is separation of the two DNA strands.



(c) Each parental strand now serves as a template that determines the order of nucleotides along a new complementary strand.

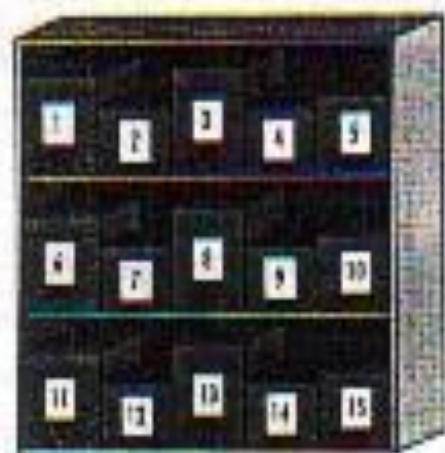


(d) The nucleotides are connected to form the sugar-phosphate backbones of the new strands. Each "daughter" DNA molecule consists of one parental strand and one new strand.



## Analogy of chromosomes and genes to a library of cooking recipes

The genetic information of most organisms is too vast to be contained on a single DNA molecule. It is divided into a number of discrete packages called chromosomes. Pans have 14 chromosomes, wheat 42, humans 46 and sheep 54. Imagine a library of cooking recipes. The encyclopaedia of recipes (in the wheat nucleus) is divided into 42 volumes. When you take down volume 18 you can choose between 1000 recipes in that volume alone. Each recipe is like a gene – the information to build a single protein product. The gene might show the cell how to construct superoxide dismutase – an enzyme which protects the cell from toxic oxygen-containing chemicals. The recipe might have been for Mongolian lamb stew or chocolate cake. The gene can't protect the cell and the recipe doesn't feed the family. They must both be translated into the intended products.



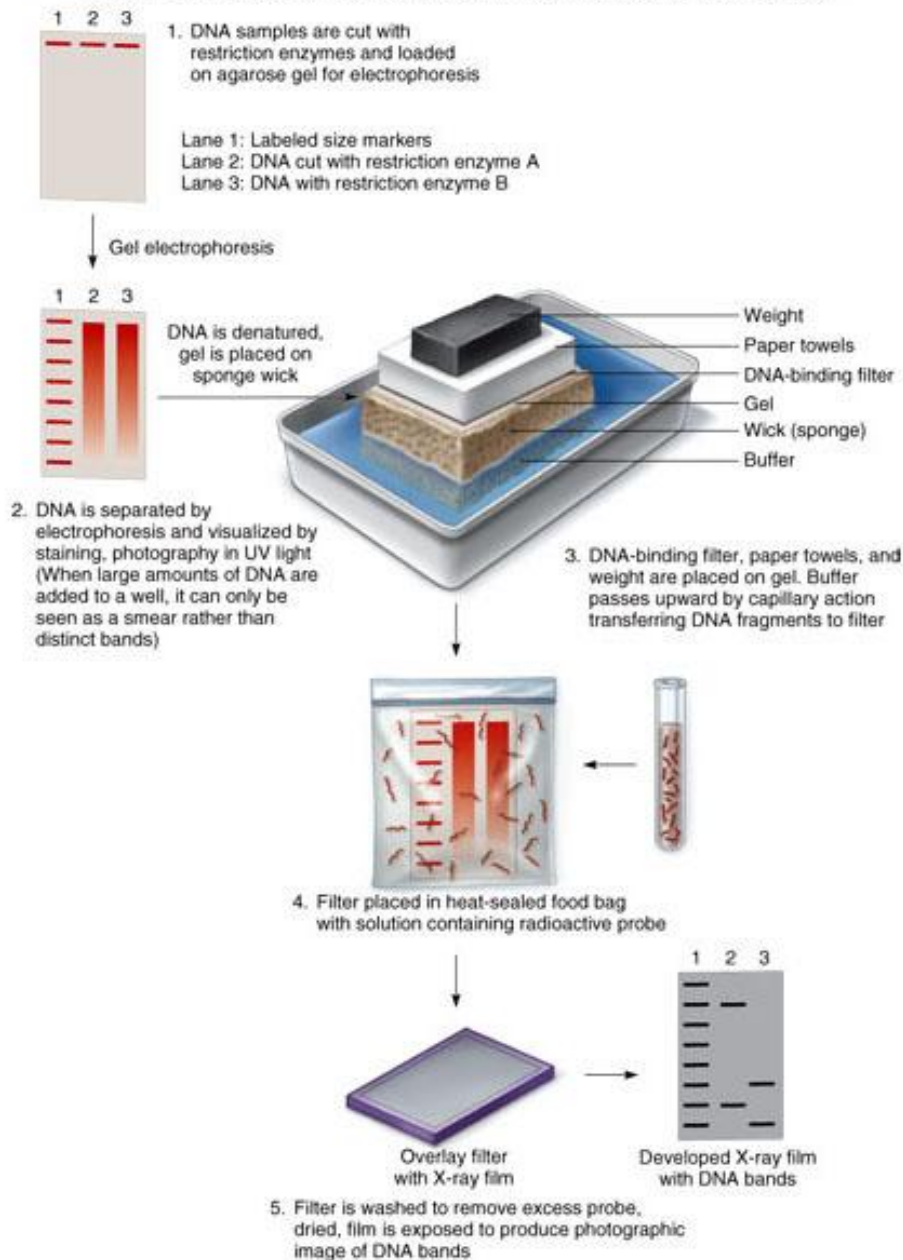
'Library' of chromosomes  
Book → chromosomes



'1 cake'  
→ 1 protein



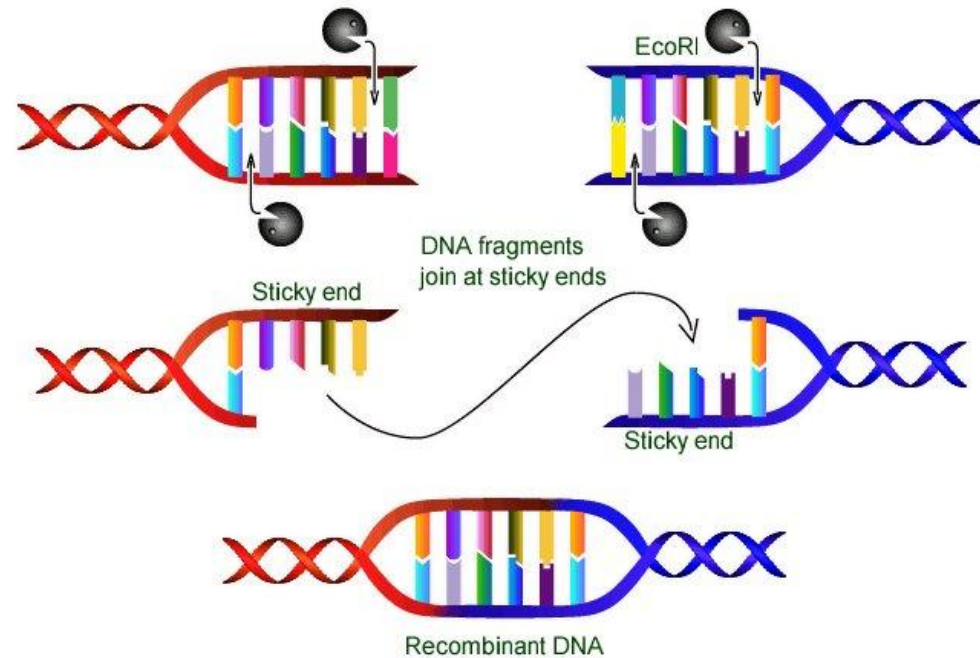
'Cook-book' of genes  
1 recipe → 1 gene



A probe is a piece of complementary DNA of known sequence, labeled with radioactivity so it can be detected

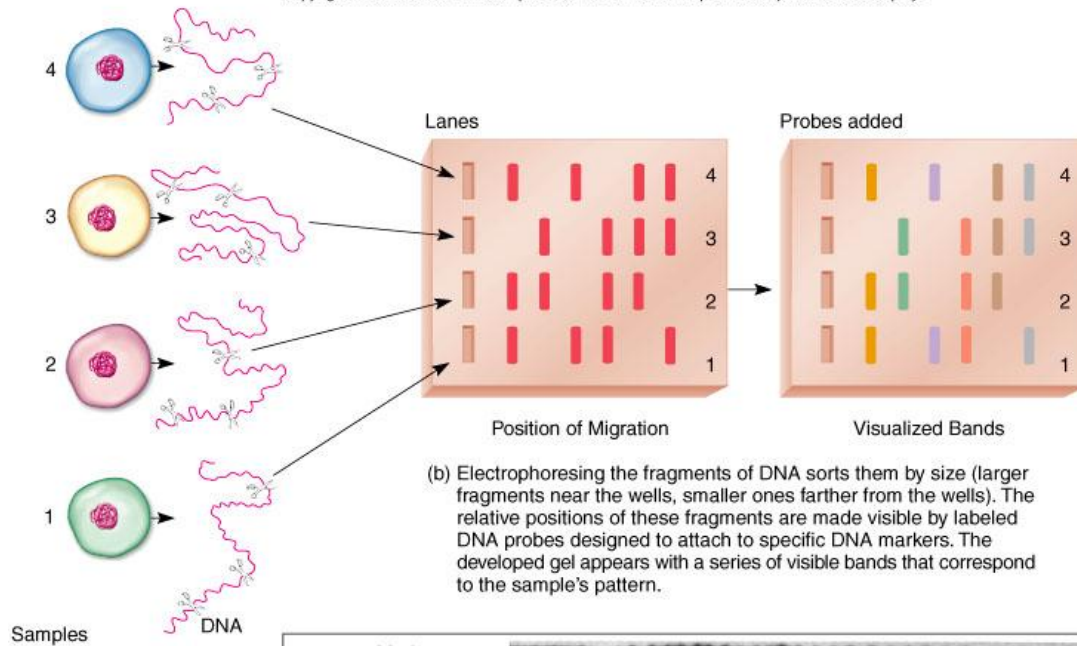
# DNA recombinant technology

## Restriction Enzyme

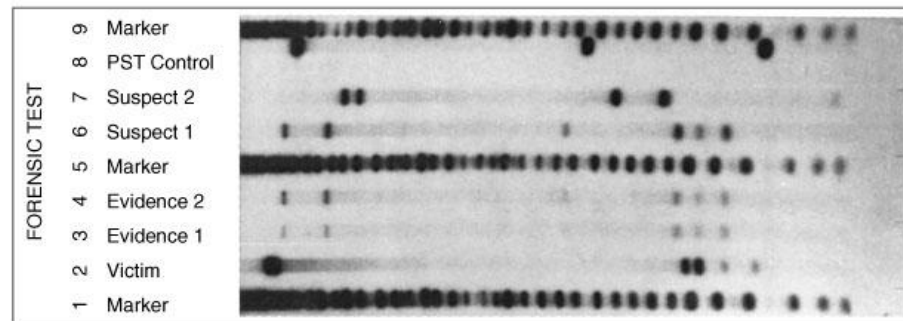


# DNA Fingerprinting: Forensics

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(a) Cells from different samples are processed to isolate their DNA. The DNA samples are exposed to endonucleases which snip them at specific sites into a series of different fragments.

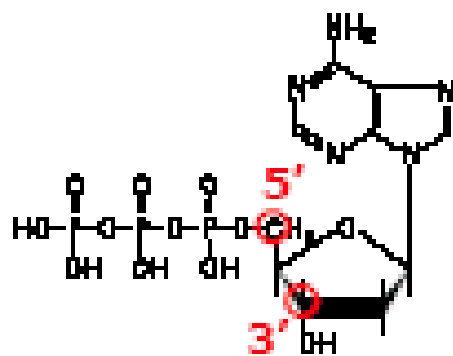


(c) An actual DNA fingerprint used in a rape trial. Control lanes with known markers are in lanes 1, 5, 8, and 9. The second lane contains a sample of DNA from the victim's blood. Evidence samples 1 and 2 (lanes 3 and 4) contain semen samples taken from the victim. Suspects 1 and 2 (lanes 6 and 7) were tested. Can you tell by comparing evidence and suspect lanes which individual committed the rape?

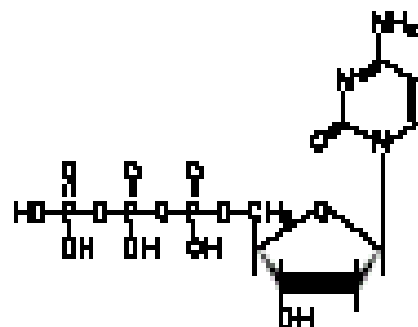
# DNA: deoxyribonucleic acids

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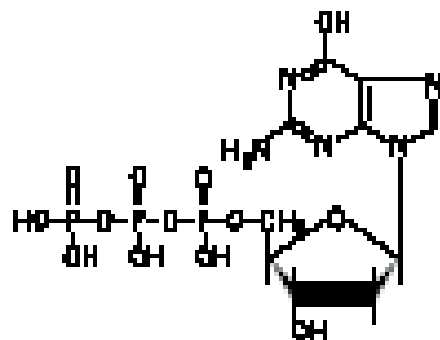
- All genetic information is written in DNA
- It is conveyed by the sequence of its four nucleotide building blocks



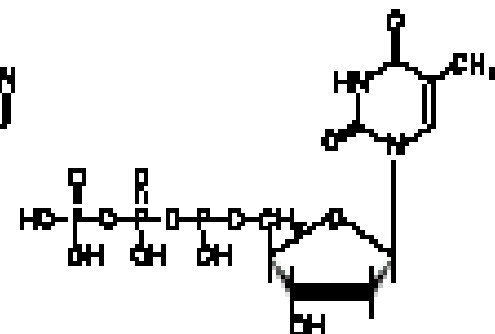
deoxy **A**TP



deoxy **C**TP

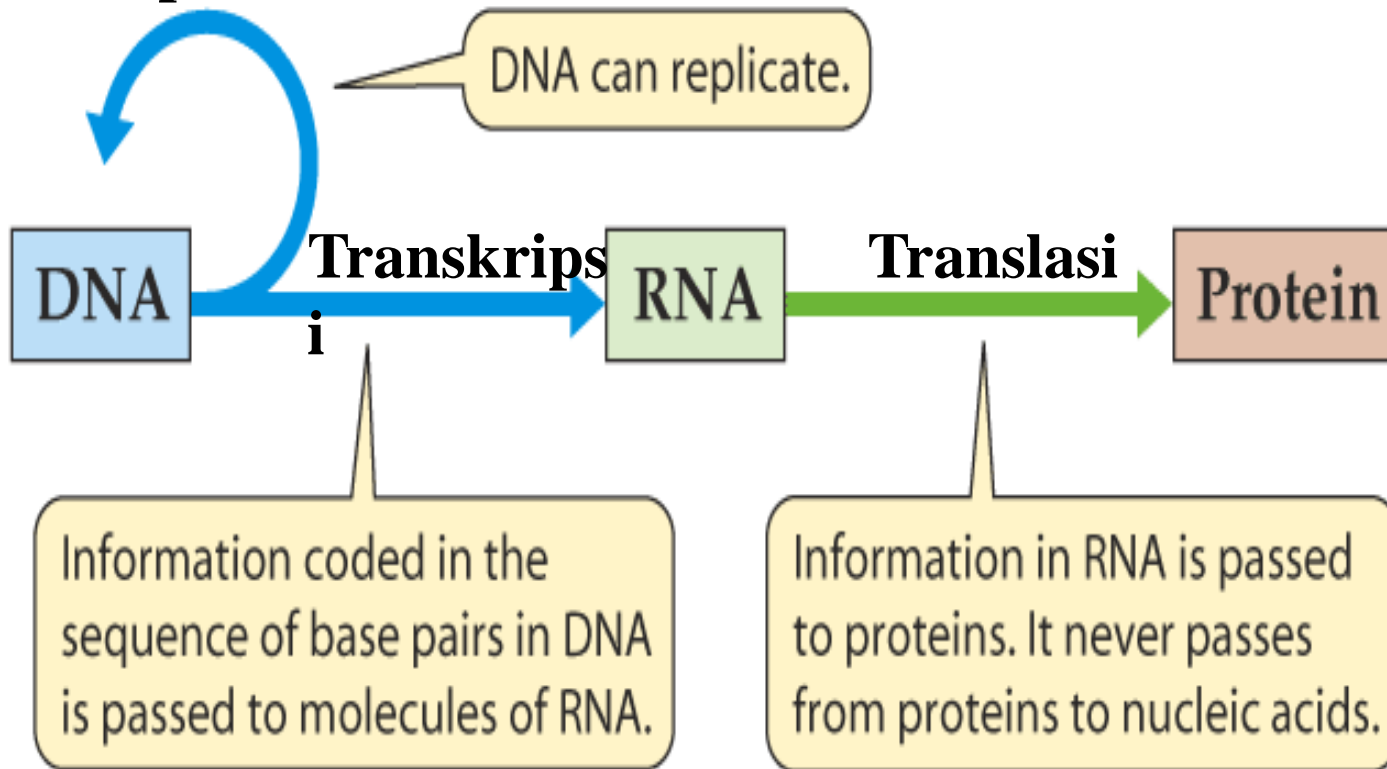


deoxy **G**TP



deoxy **T**TP

## Replikasi



## Analogy of the magnetic tape of a music cassette and genes

The magnetic code on the tape is not itself music but must be translated into music by the machine. As the tape runs past the 'heads' of the machine the magnetic code is changed to electrical signals. At the speakers the electrical signals are then translated into sounds.

So too the chemical code on the DNA is not itself the capacity to perform cell functions. The chemical code must be translated by the cell's machinery into proteins, each of which performs highly specific tasks such as those of enzymes, antibodies or hormones.

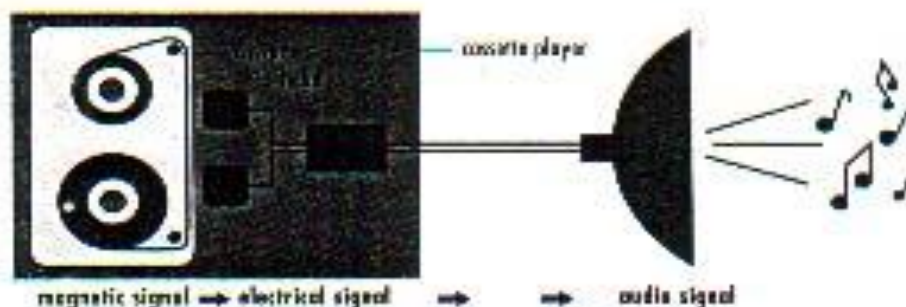
The message on the DNA is first transcribed into a different dialect of the same basic language. This occurs when the cell nucleus copies each gene into a strand of RNA molecule (the messenger RNA, or mRNA). Next the mRNA travels from the chromosome and cell nucleus to the cytoplasm where teams of ribosomes zip along the strand. As they run along the chemical message they translate the coded sequence into a completely different language — the language of the proteins. The proteins emerge from this translation synthesis and fold into shapes able to perform the tasks for which they are designed.

### The Central Dogma

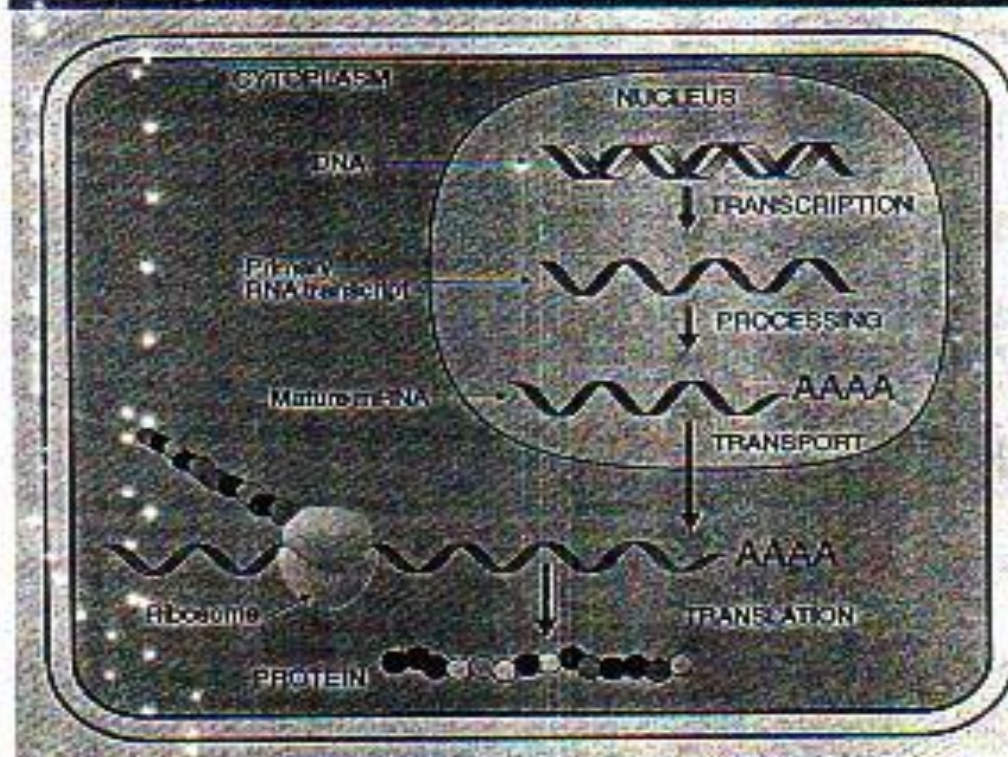
Biological information flow is from DNA to RNA to protein

DNA is said to be transcribed into RNA

RNA is said to be translated into protein



## Eukaryotic gene expression



# K U I S : I (2012)

**Petunjuk: Jawab singkat, jelas, kerjakan dg jujur dan teliti (Tulis Nama. No, absen/NIM, td. tangan). Jawaban HARUS urut No,**

- 1. Terangkan kenapa terjadi penyimpangan HK Mendel, berikan contohnya. (15)**
- 2. Terangkan beberapa isitilah: poligen, kodominan (mhs **GANJIL**), intermedier, kodominan (mhs **GENAP**) (15)**
- 3. Terangkan yg dimaksud **kariotiping dan DNA Sequencing** apa manfaatnya bagi genetika ternak. Berikan contohnya (20).**
- 4. Terangkan pengertian rekombinasi kromosom dan abnormalitas kromosom. Kenapa perkawinan antar spesies ternak dapat menyebabkan kelainan genetik?(20)**
- 5. Apa beda DNA dan RNA dan (15)**
- 6. Terangkan tentang paternity test dan DNA forensics (15)**