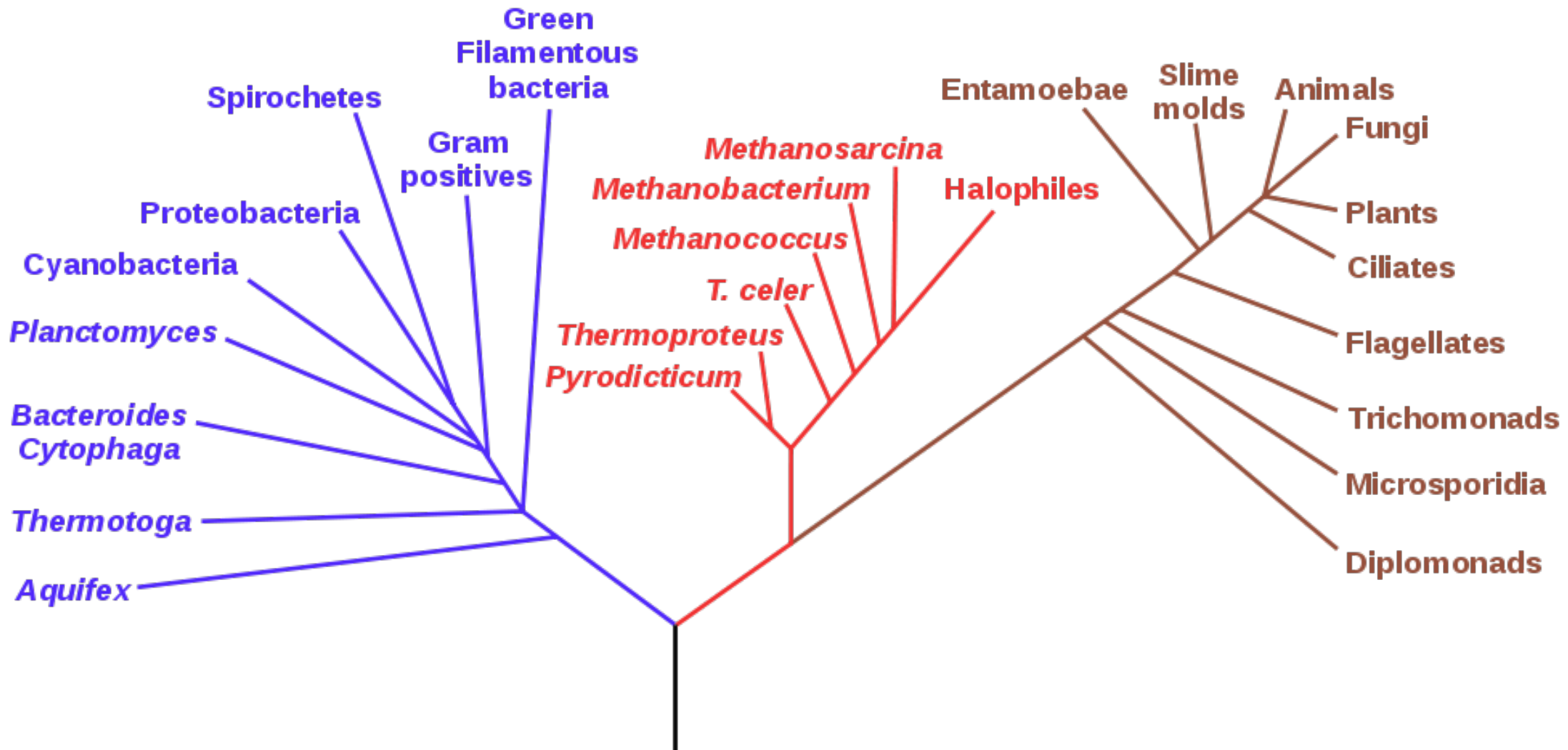


Phylogenetic Tree of Life

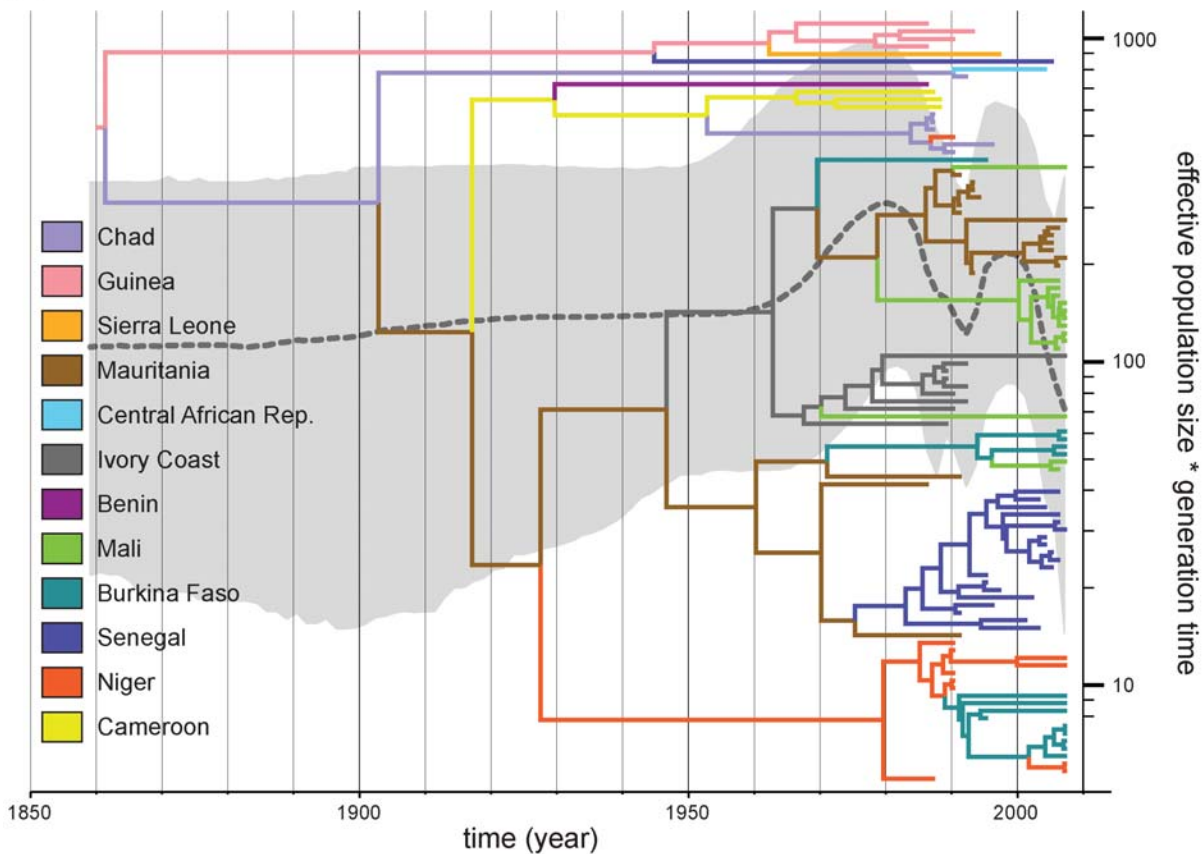
Bacteria

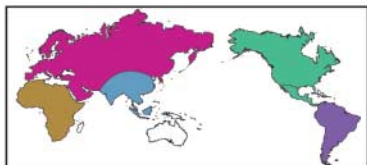
Archaea

Eucaryota



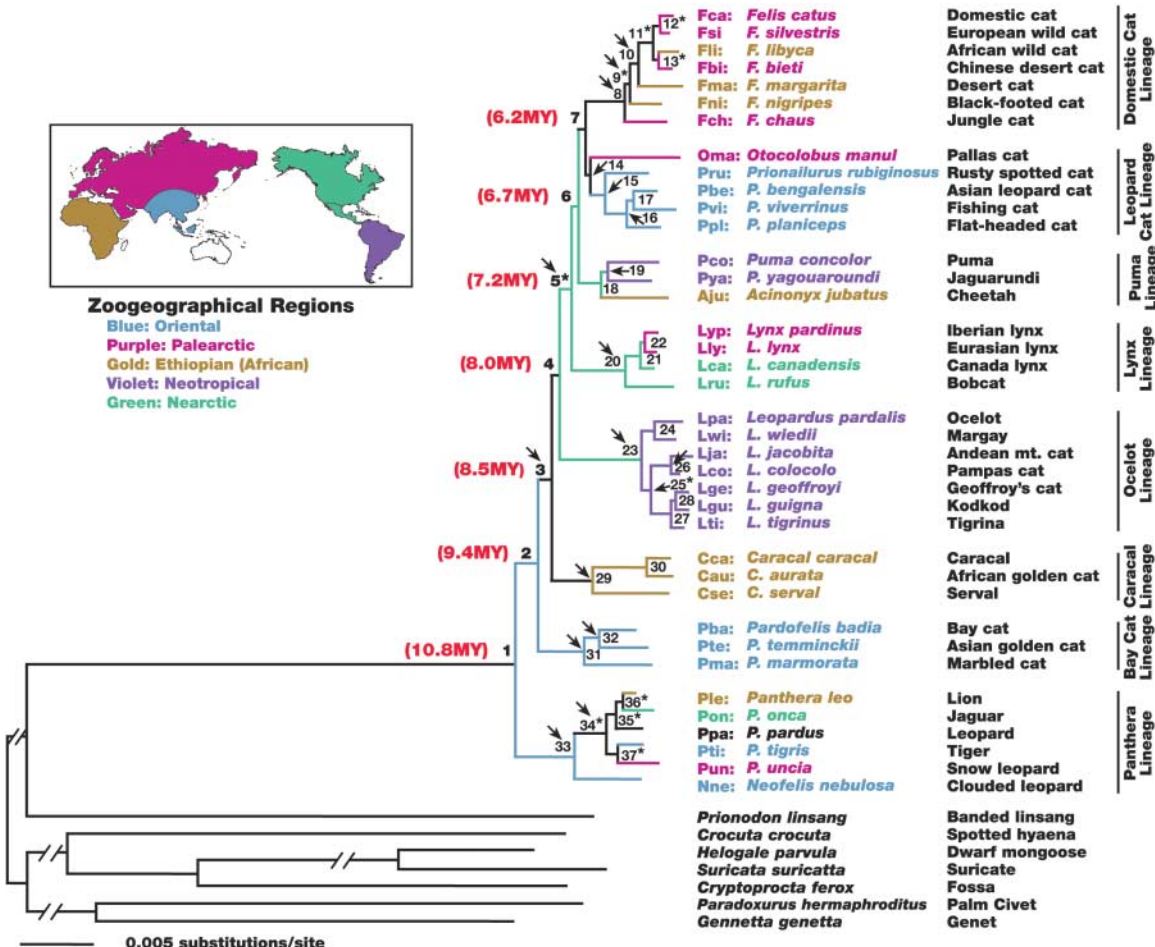
A



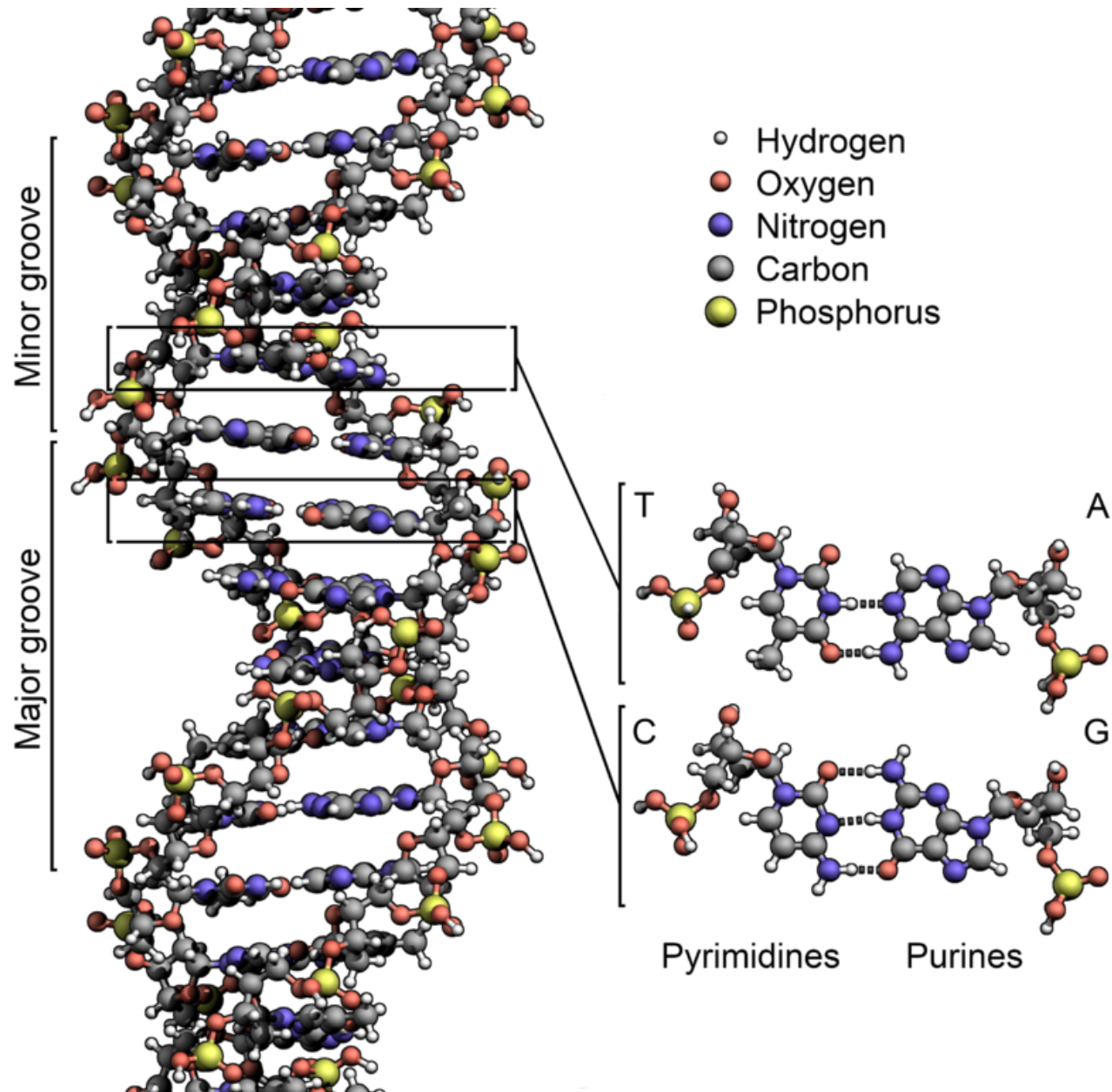


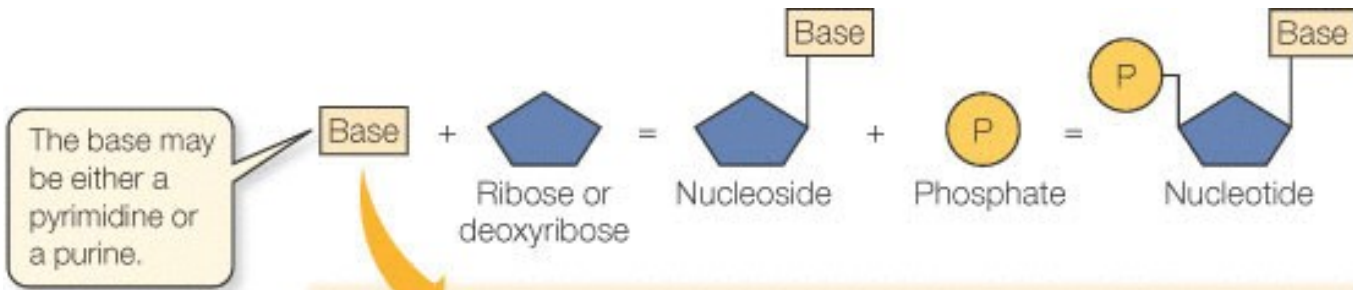
Zoogeographical Regions

Blue: Oriental
 Purple: Palearctic
 Gold: Ethiopian (African)
 Violet: Neotropical
 Green: Nearctic

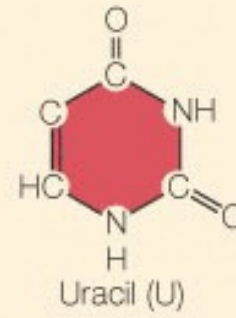
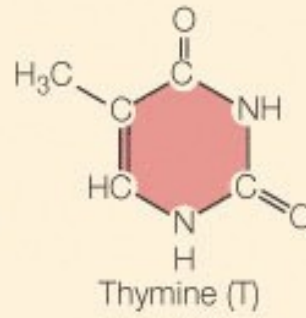
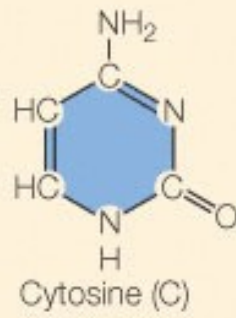




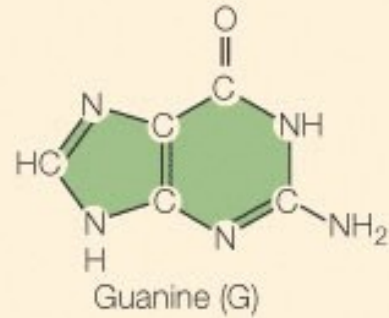
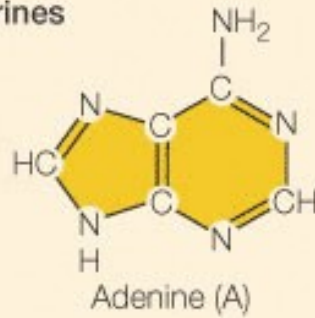




Pyrimidines



Purines



Biomolecular sequences

DNA 5' – **ACGATCGACTGGTATATCGATGCT** – 3'

$$X_i \in \{A, C, G, T\}$$

RNA 5' – **ACGAUCGACUGGUUAUAUCGAUGC**U – 3'

$$X_i \in \{A, C, G, U\}$$

Protein **MFINRWLFSTNHKDIGTLYLLFGAW**

$$X_i \in \{A, R, N, D, C, E, Q, G, H, I, L, K, M, F, P, S, T, W, Y, V\}$$

★Size of the Human genome: 3 billion DNA base pairs
(6×10^9)

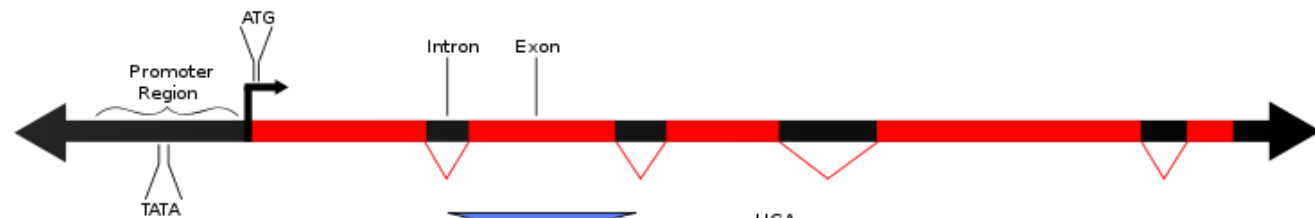
★Diameter of average human cell nucleus: $1.7 \mu\text{m}$
($1.7 \times 10^{-6} \text{m}$)

★If stretched, one human genome would be about
2-3m in length.

★If stretched, total DNA in a human body would be
about 70 round-trips between earth and the sun.

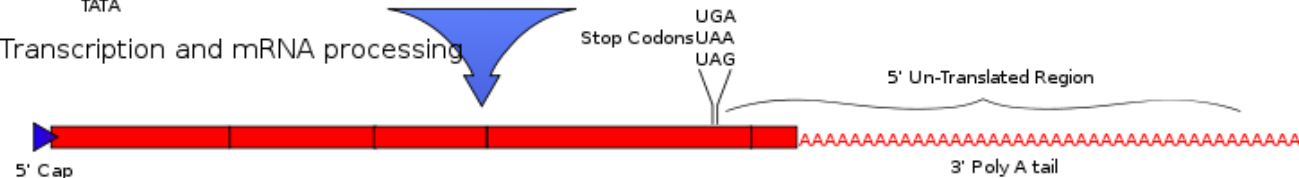
Central Dogma of Molecular Biology : Eukaryotic Mode

DNA



Transcription and mRNA processing

mRNA

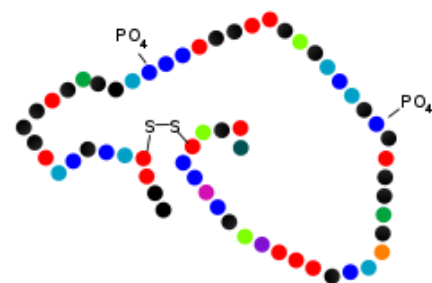


Translation

Protein



Post-Translational Modification



Active Protein

What is a gene?

