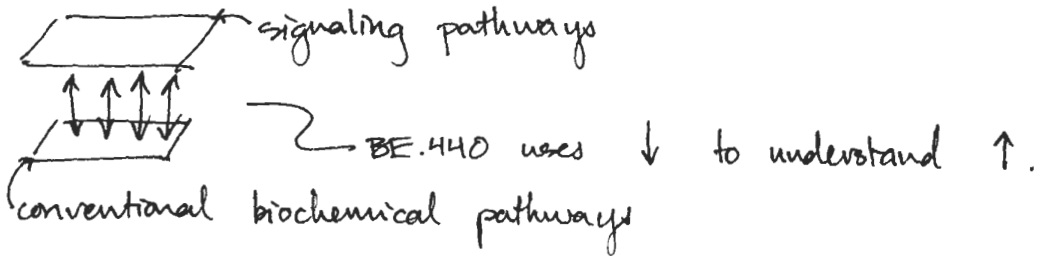


BE.440

10 September 2004

Essigmann

Hanahan & Weinberg:



Topic: Evolution

(Replication, Recombination, Transcription, Translation)

Board: Storage, Replication, Evolution, and Transmission of biological info.

Some Definitions:

chemistry: the synthesis & properties of matter

engineering: measurement, modeling, mining, manipulating

biology: the science of life

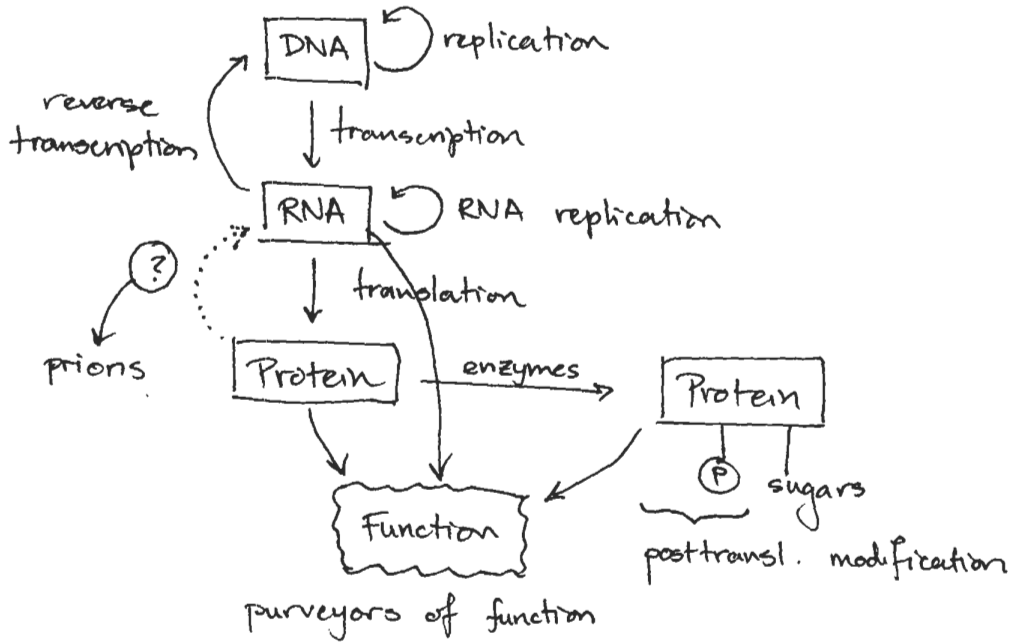
- LIFE
- 1.) maintain order (crystals do this!)
 - 2.) reproduce (what about mules?)
 - 3.) evolve (mutation is sometimes an asset)

Life is hard to define!

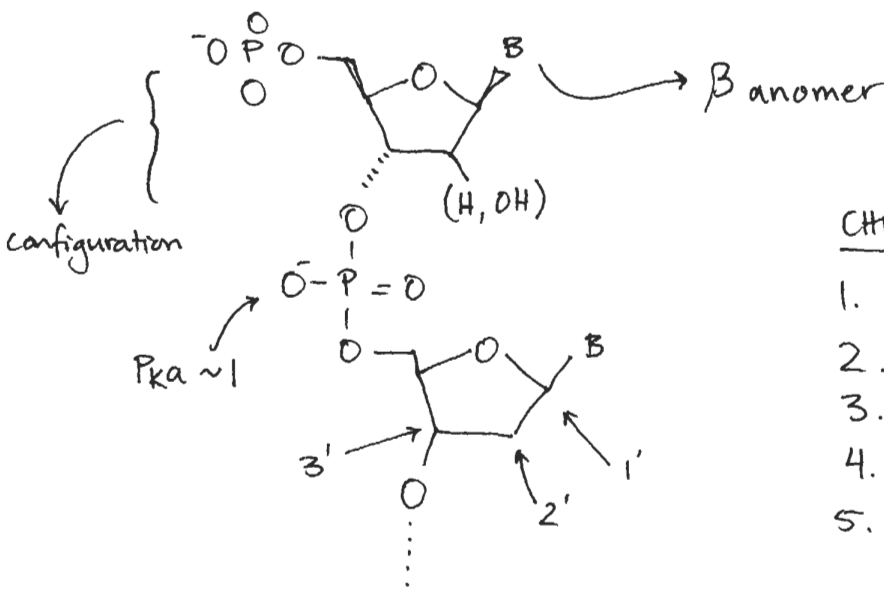
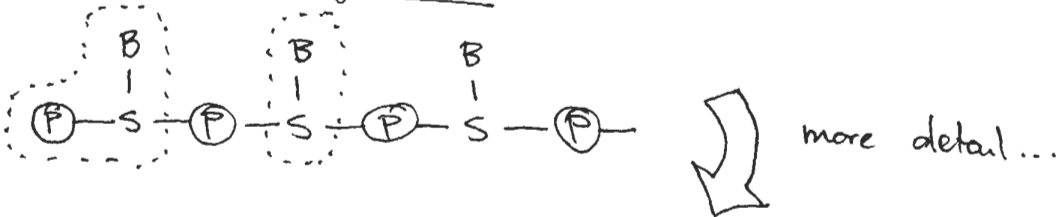
DNA { inheritance
expression
evolution

RNA { expression
(inheritance)
catalyst

Central Dogma (expanded from Ram's PPT)



DNA, RNA = Biopolymers.

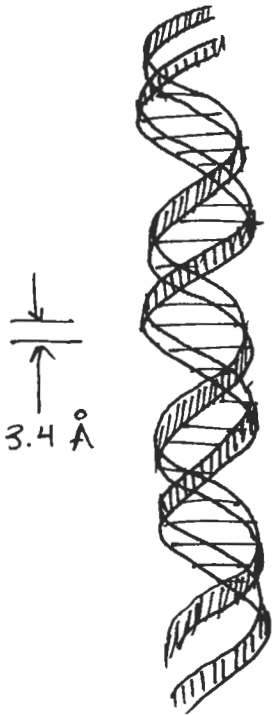


CHECKLIST:

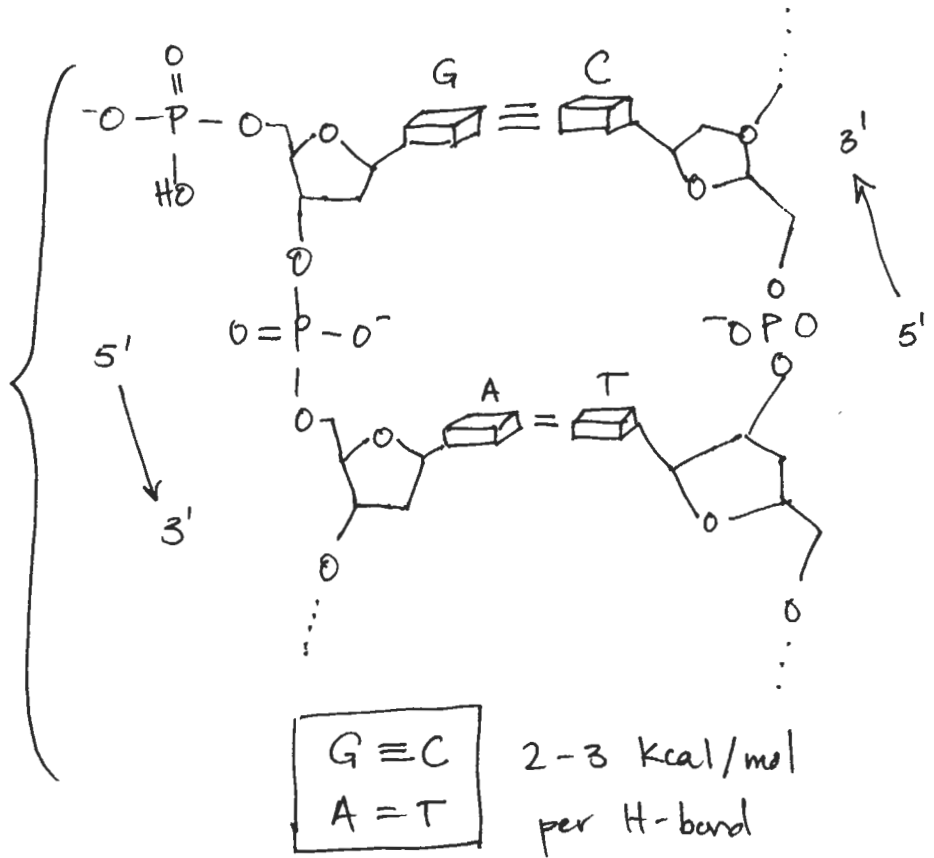
1. Pka = 1
 2. β anomer (stereochemistry)
 3. PDE
 4. H, OH at 2'
 5. 5' \rightarrow 3'
- (synthesis, encoding)

even more detail (DNA)

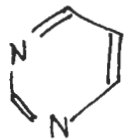
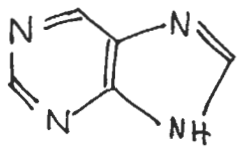
H-bonding preferences & energetics



10 BP = 34 Å
3.4 Å



Base Pairing



purine

pyrimidine

prototypes

G ≡ C

A = T (U)

Note: dR vs. R
T vs. U

Back to Arkin paper...

Two ways to get evolution:

1. Replication / repair error

2. Transposon-like mutation

(Mismatch repair \ominus \rightarrow causes hyperrecombinogenic phenotype)

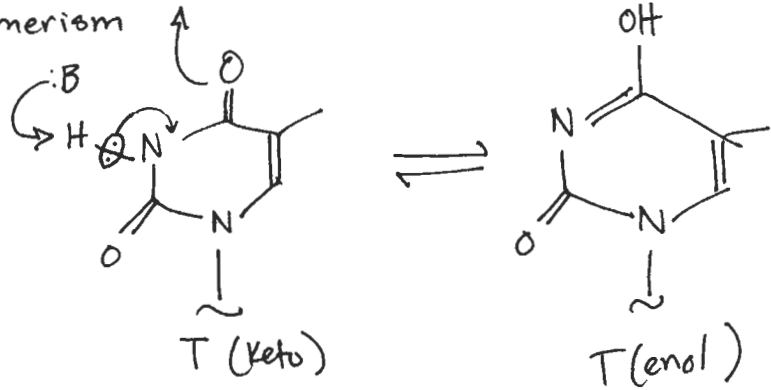
Example 1: Natural Tautomerism

Keto \rightleftharpoons enol

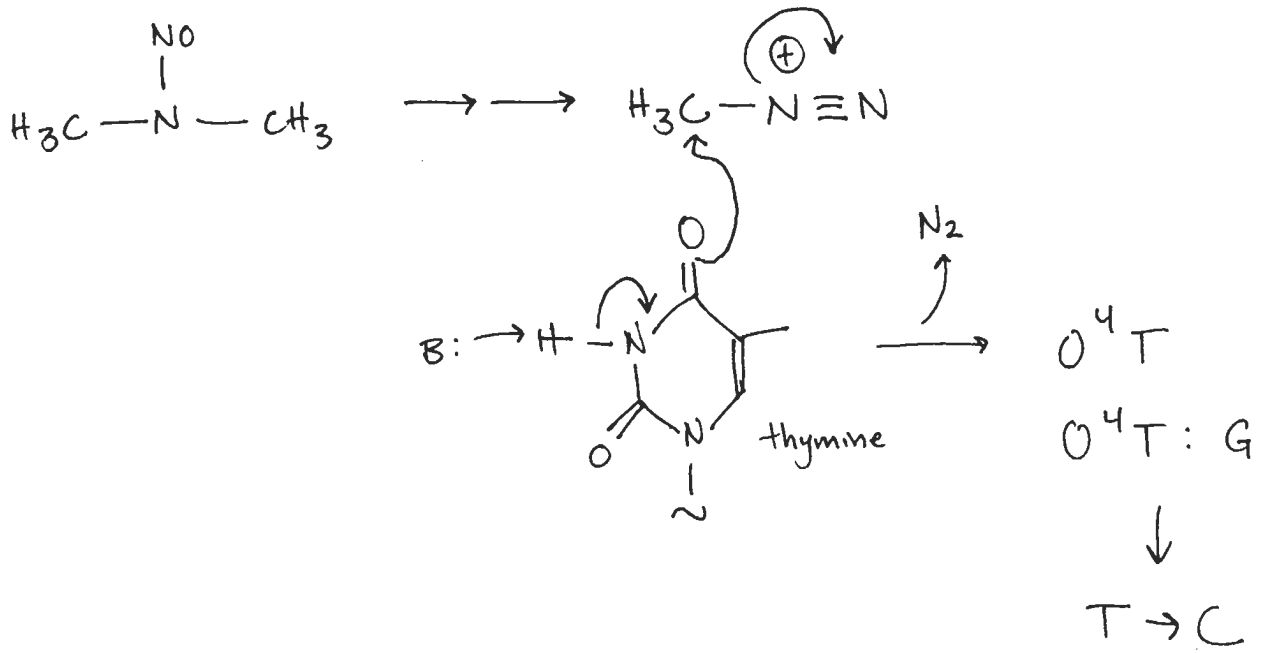
10^4 : 1

Amino \rightleftharpoons Imino

10^4 : 1



Example 2 :



Example 3 :

