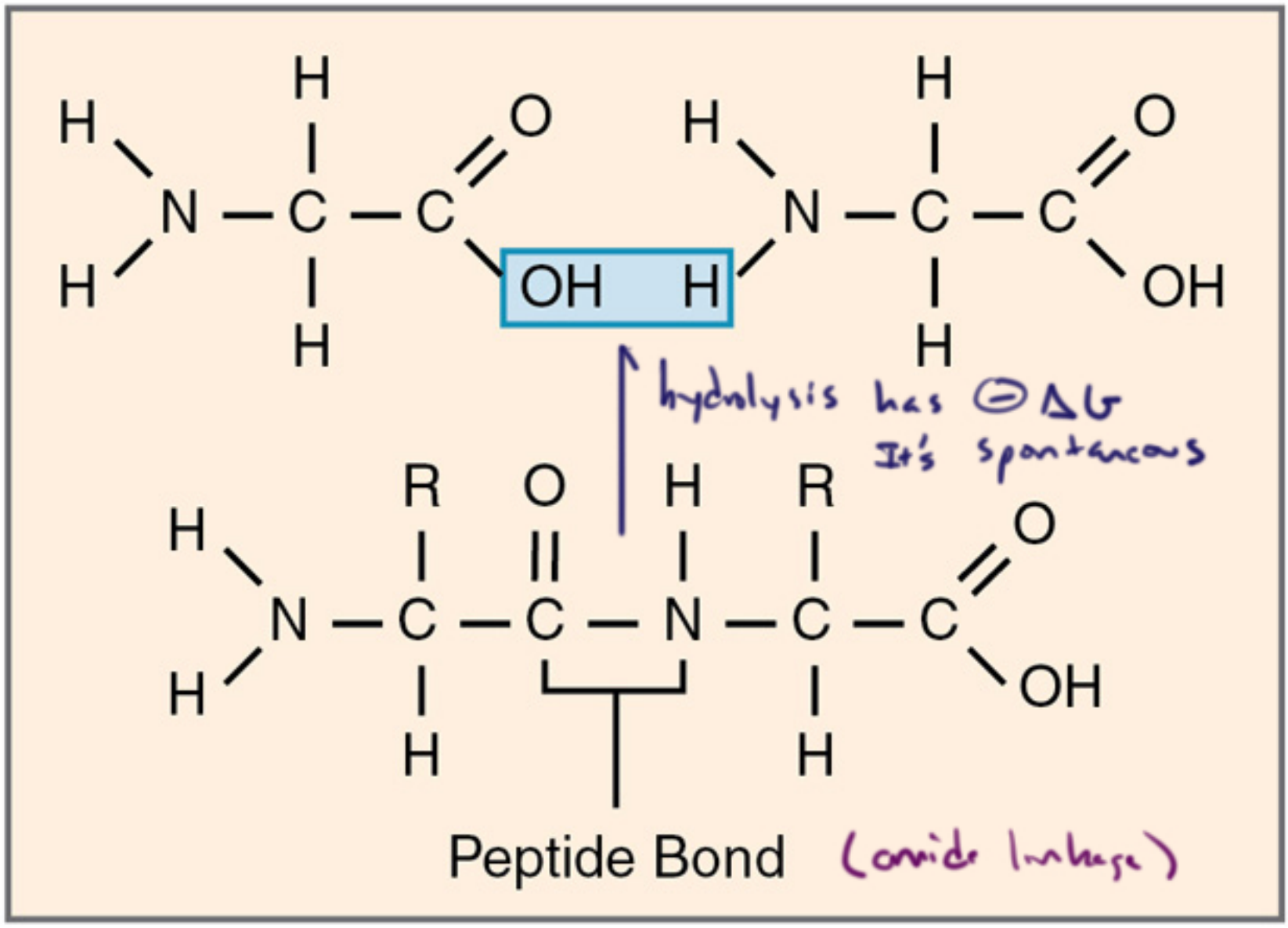
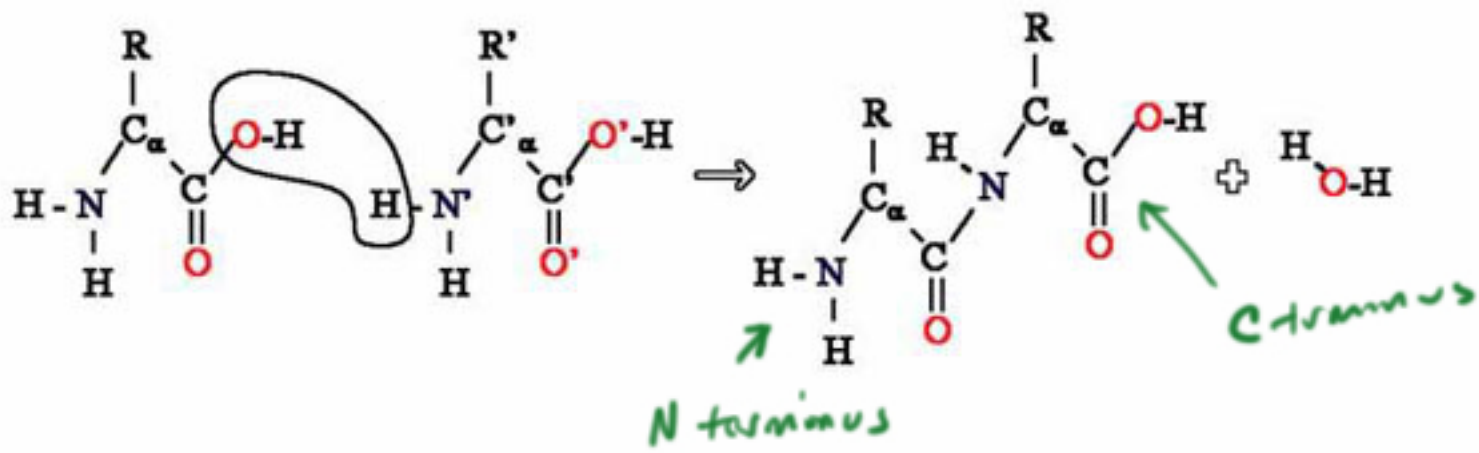
Protein Structure

Session Slides with Notes



Proteins are not thermodynamically stable
but they are kinetically stable



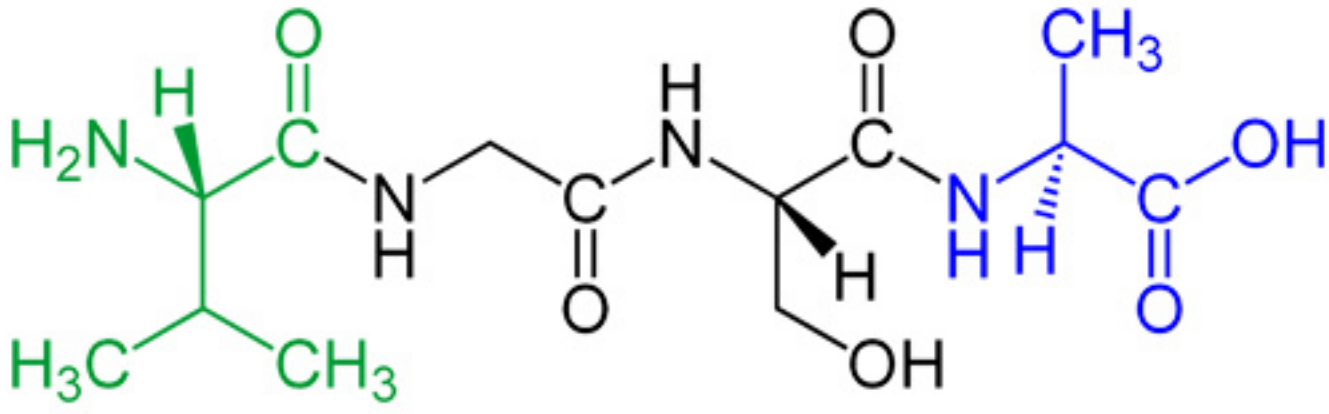
Orienting a polypeptide

1) Find the N terminus and C terminus

2) Confirm backbone
N-C-C-N-C-N

3) Identify side chains

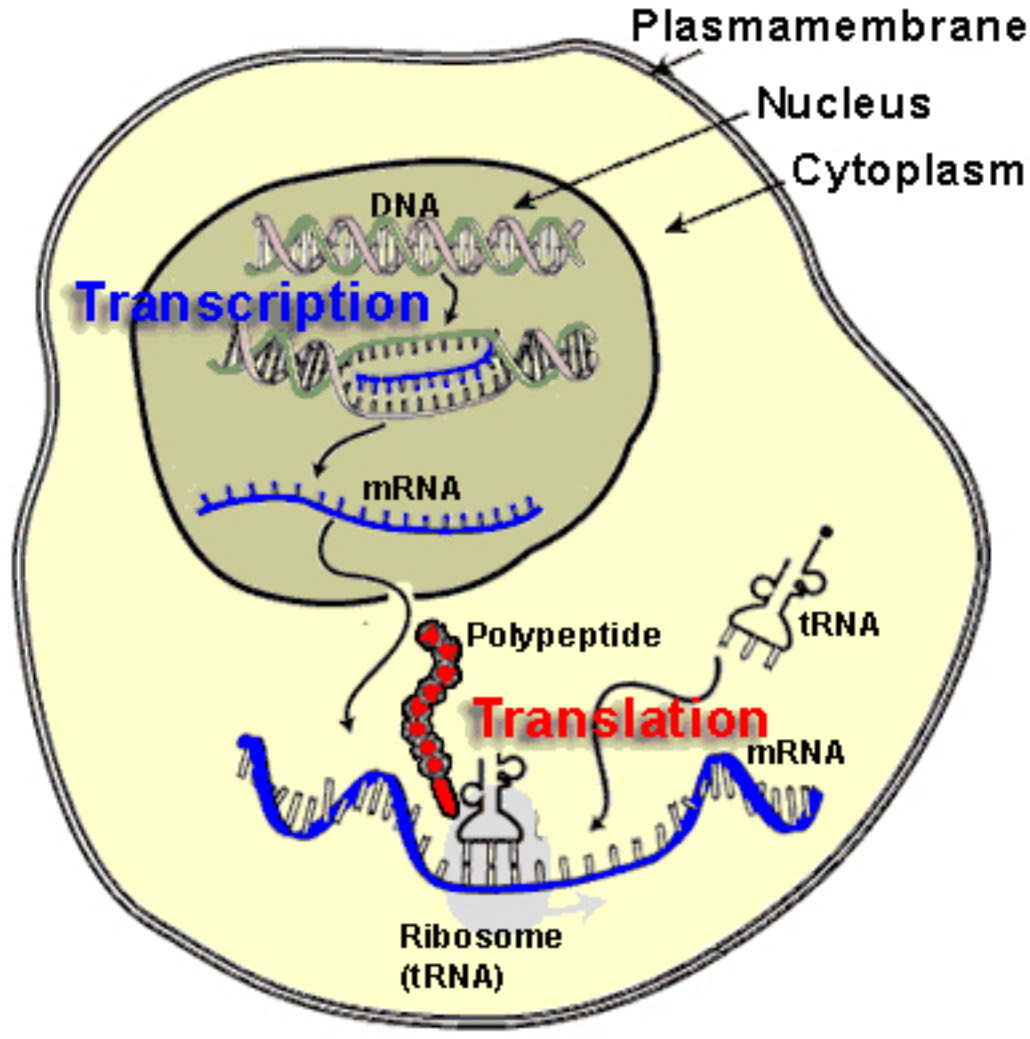
Tetrapeptide

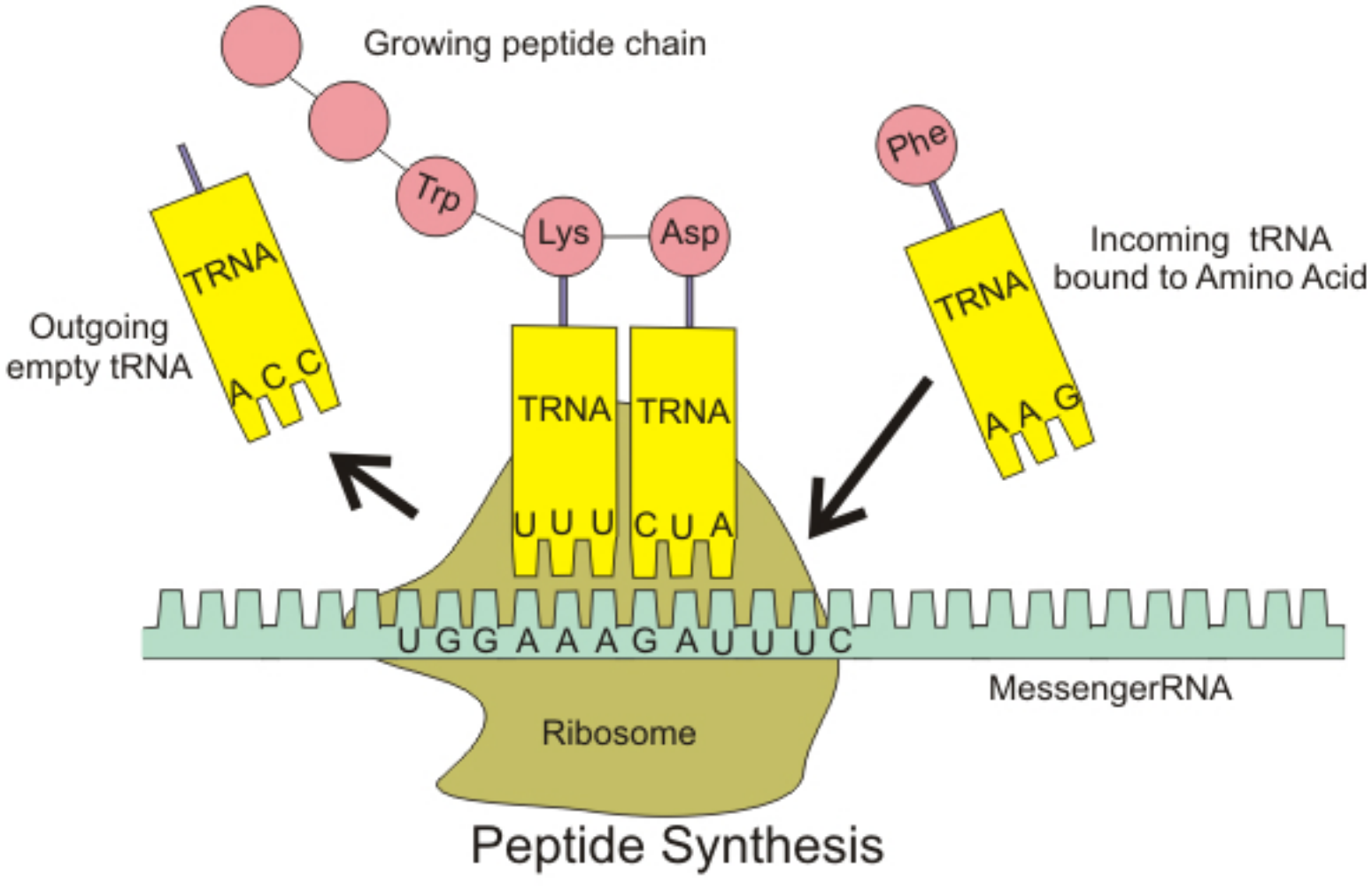


V G S A

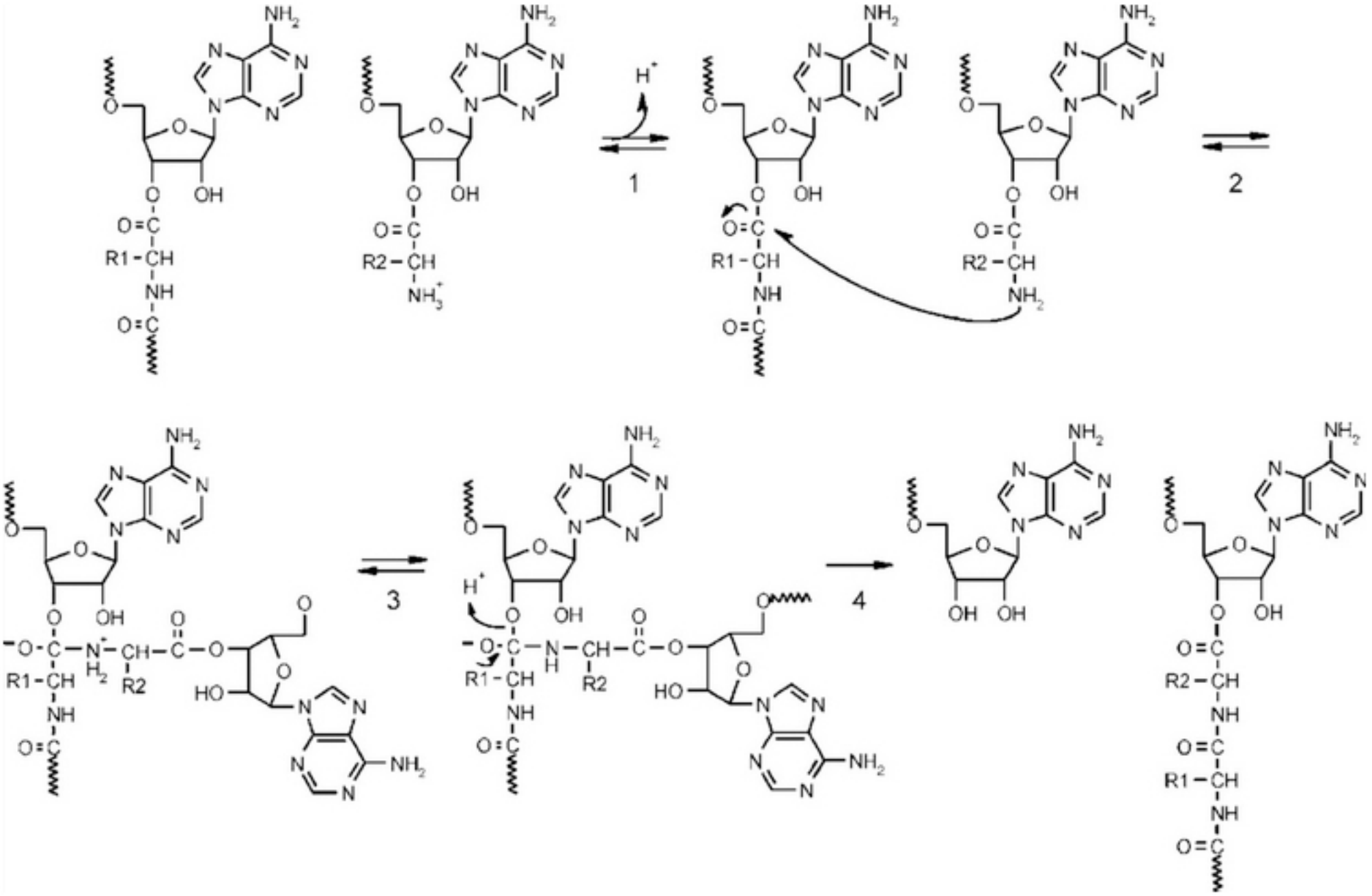
Central Dogma

Transcription
&
Translation

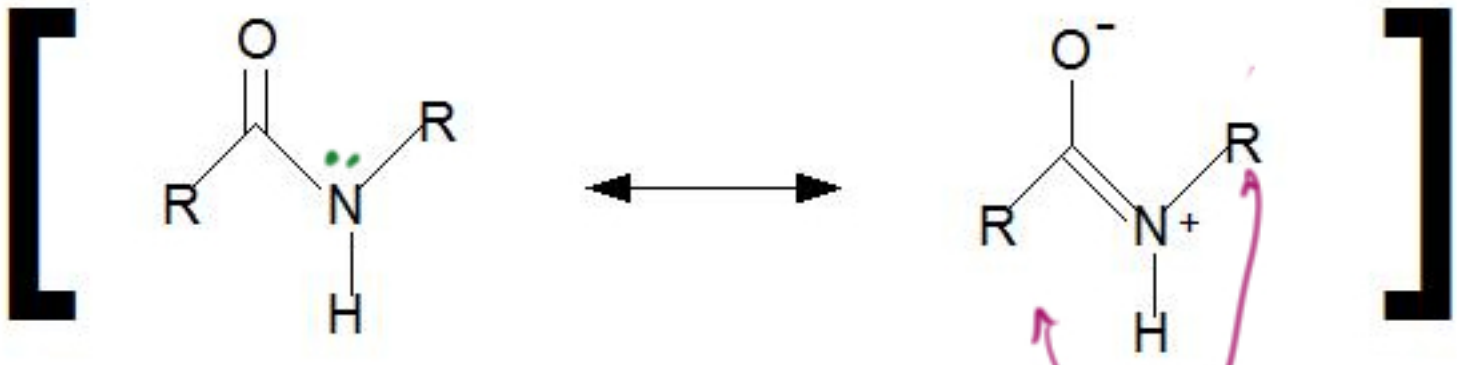




Peptide Synthesis

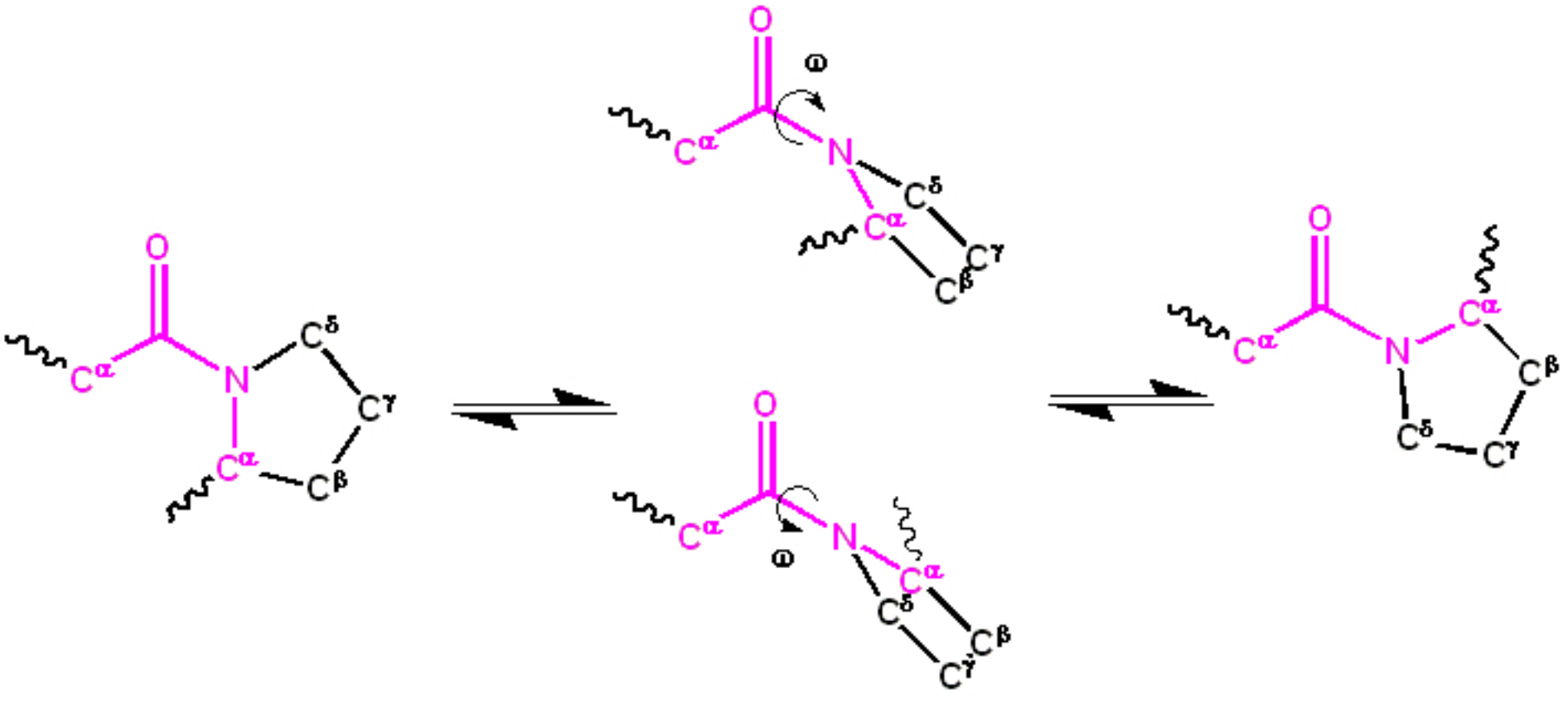

1
2
3
4

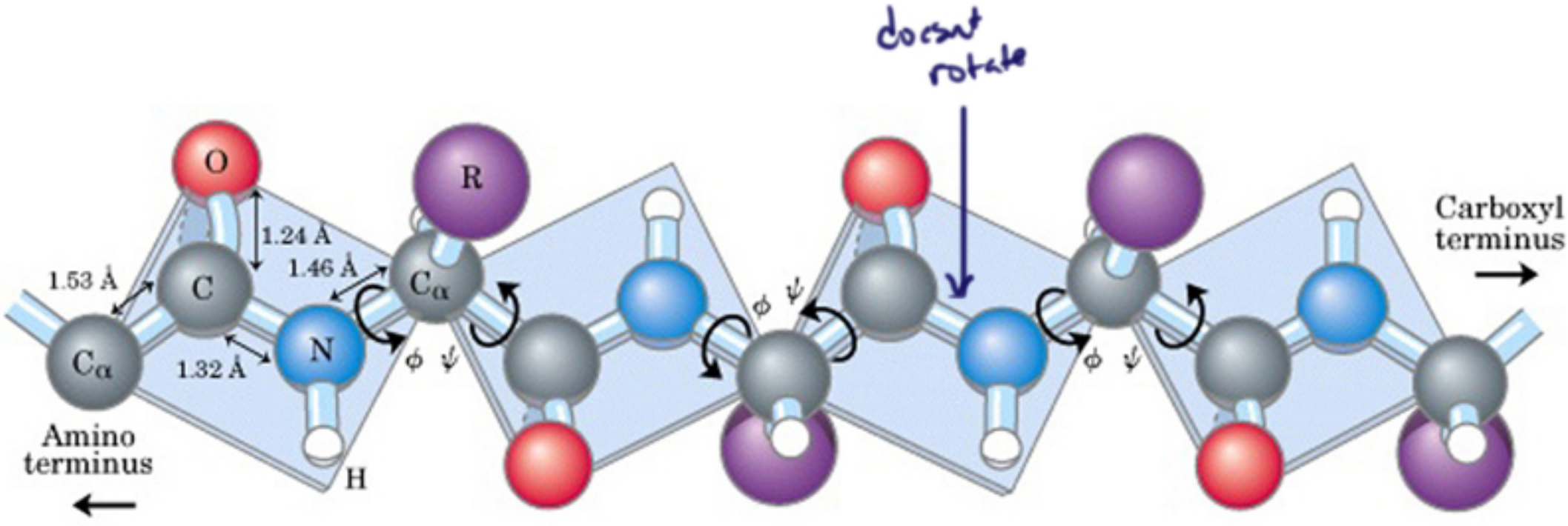
Peptide bond is rigid and planar



Peptide bond has partial double bond character

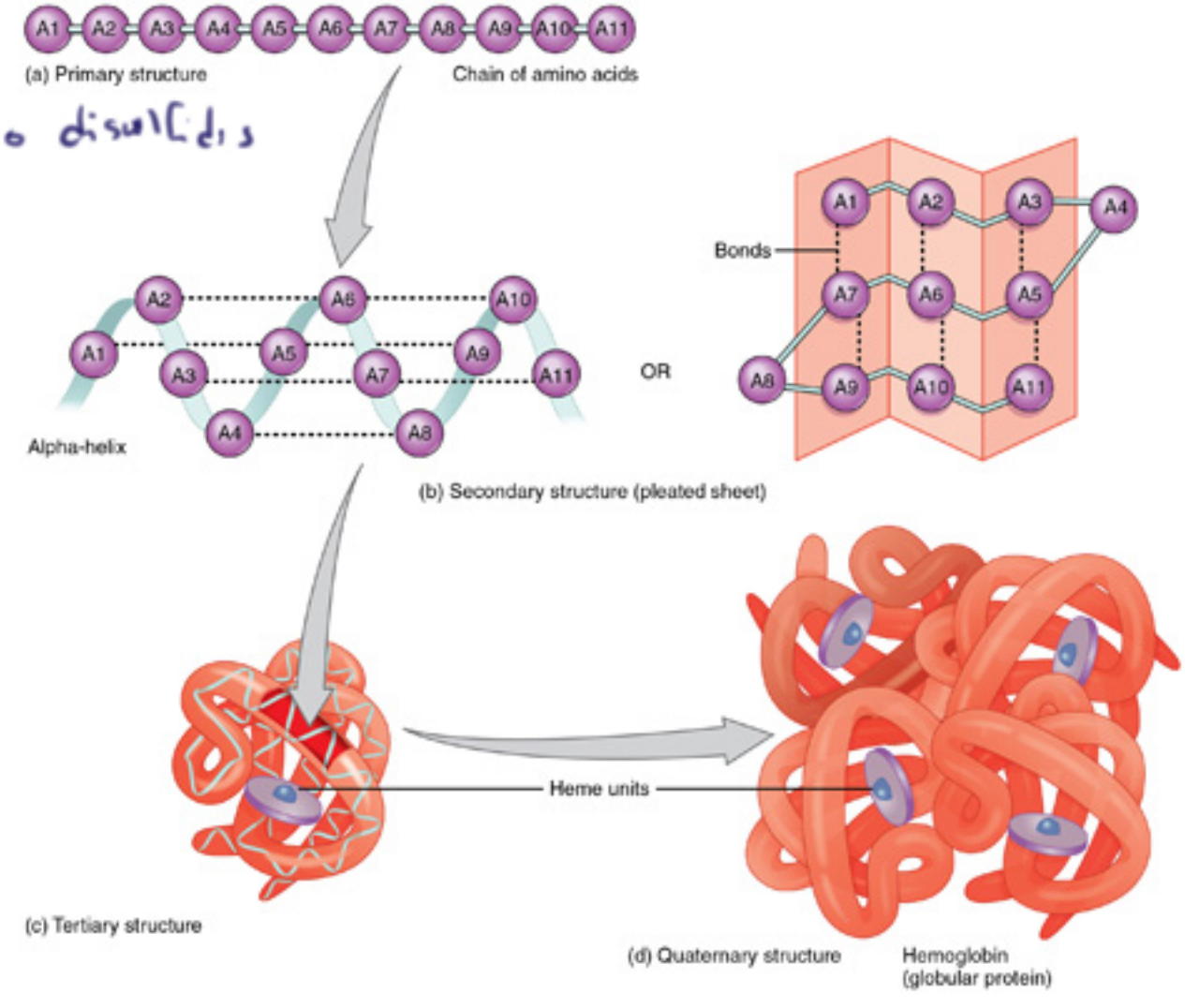
these 2 central carbons are always trans (except with proline where it's 50:50)


O
Cα
N
Cδ
Cγ
Cβ
ω


doesn't rotate
O
R
1.24 Å
1.53 Å
1.46 Å
C
Cα
N
Cα
1.32 Å
φ
ψ
Amino terminus
H
Carboxyl terminus

(b)

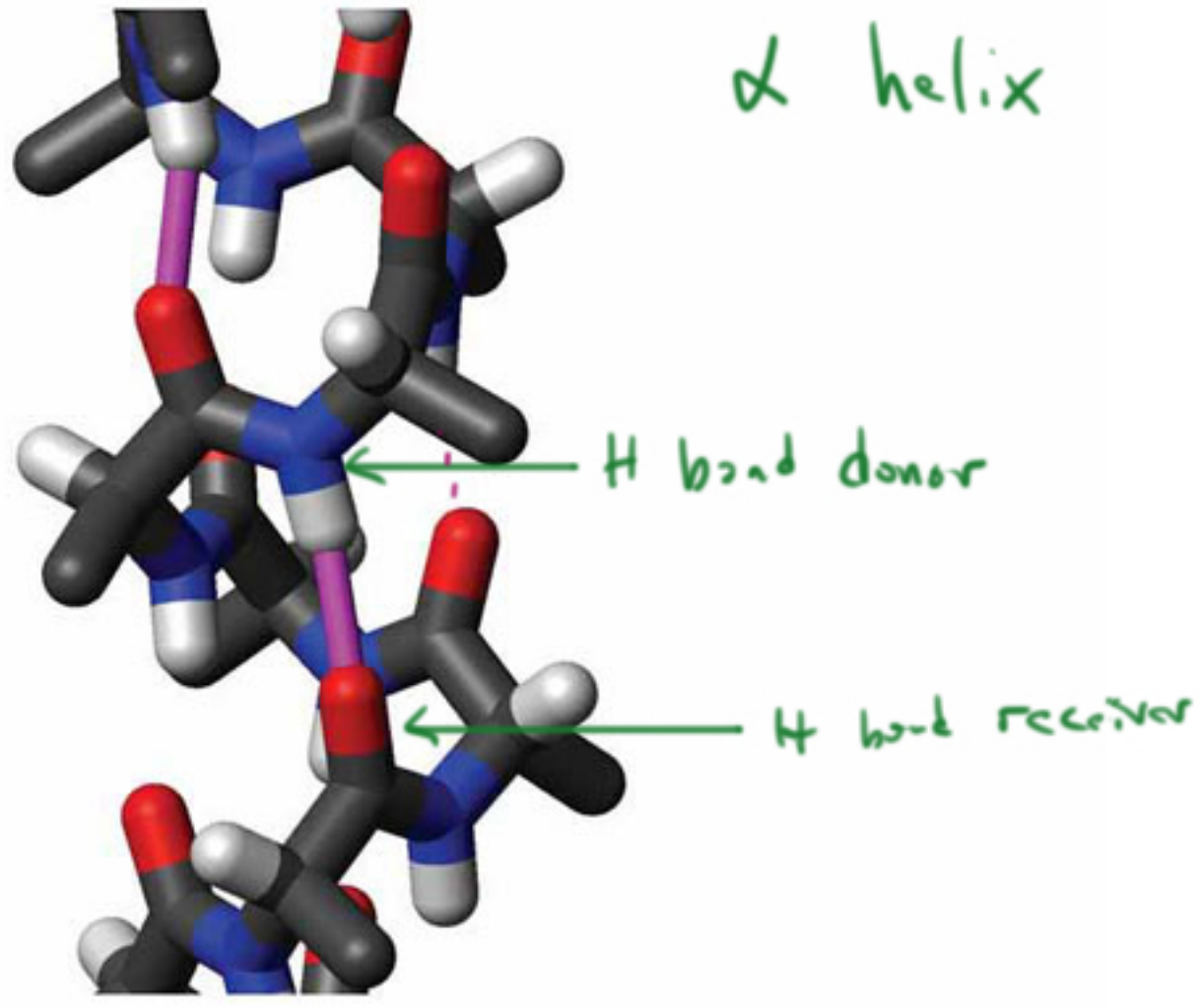
covalent bonds → also disulfides



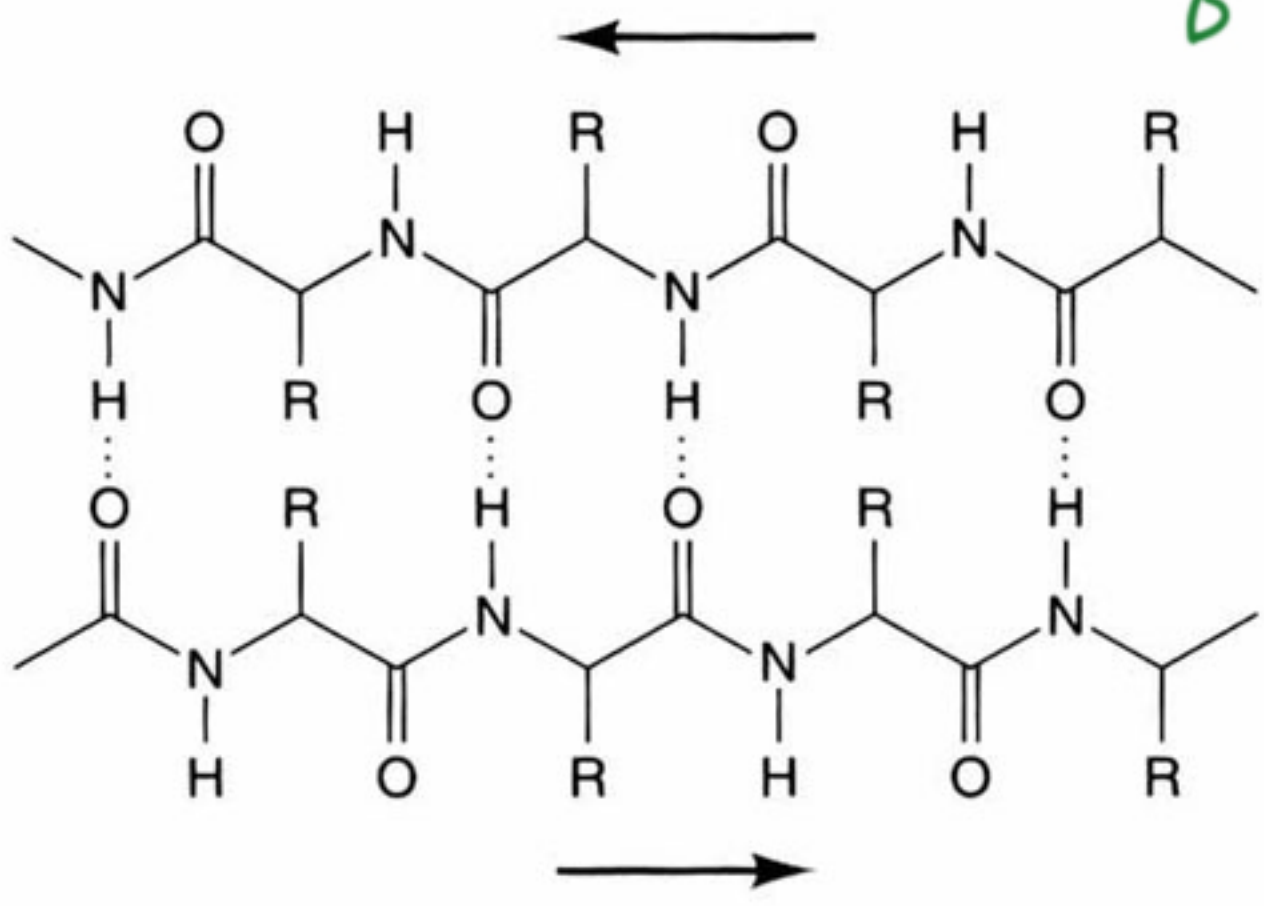
α helix

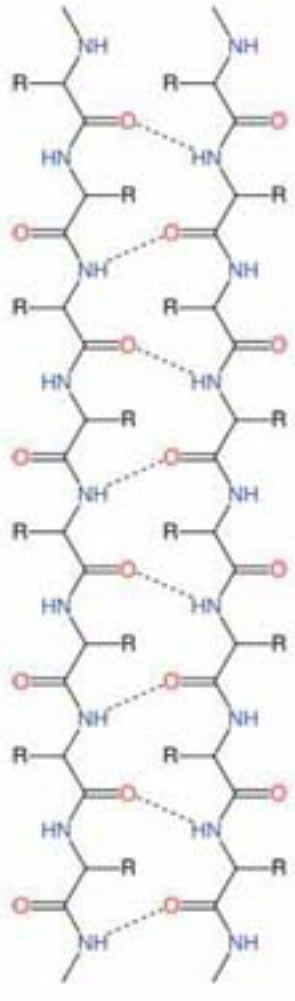
- disrupted by proline

(also glycine)

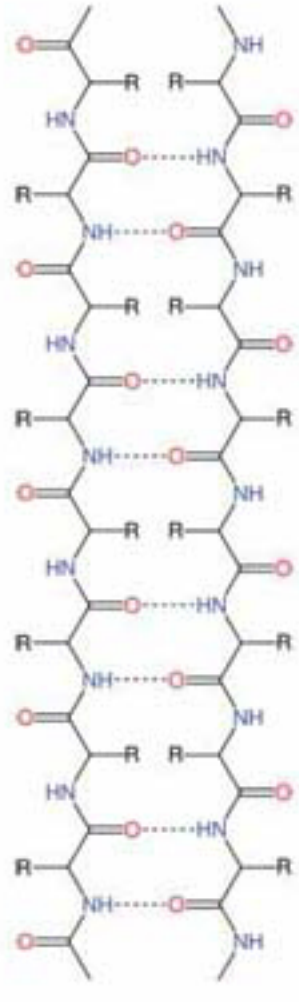


B pleated sheet

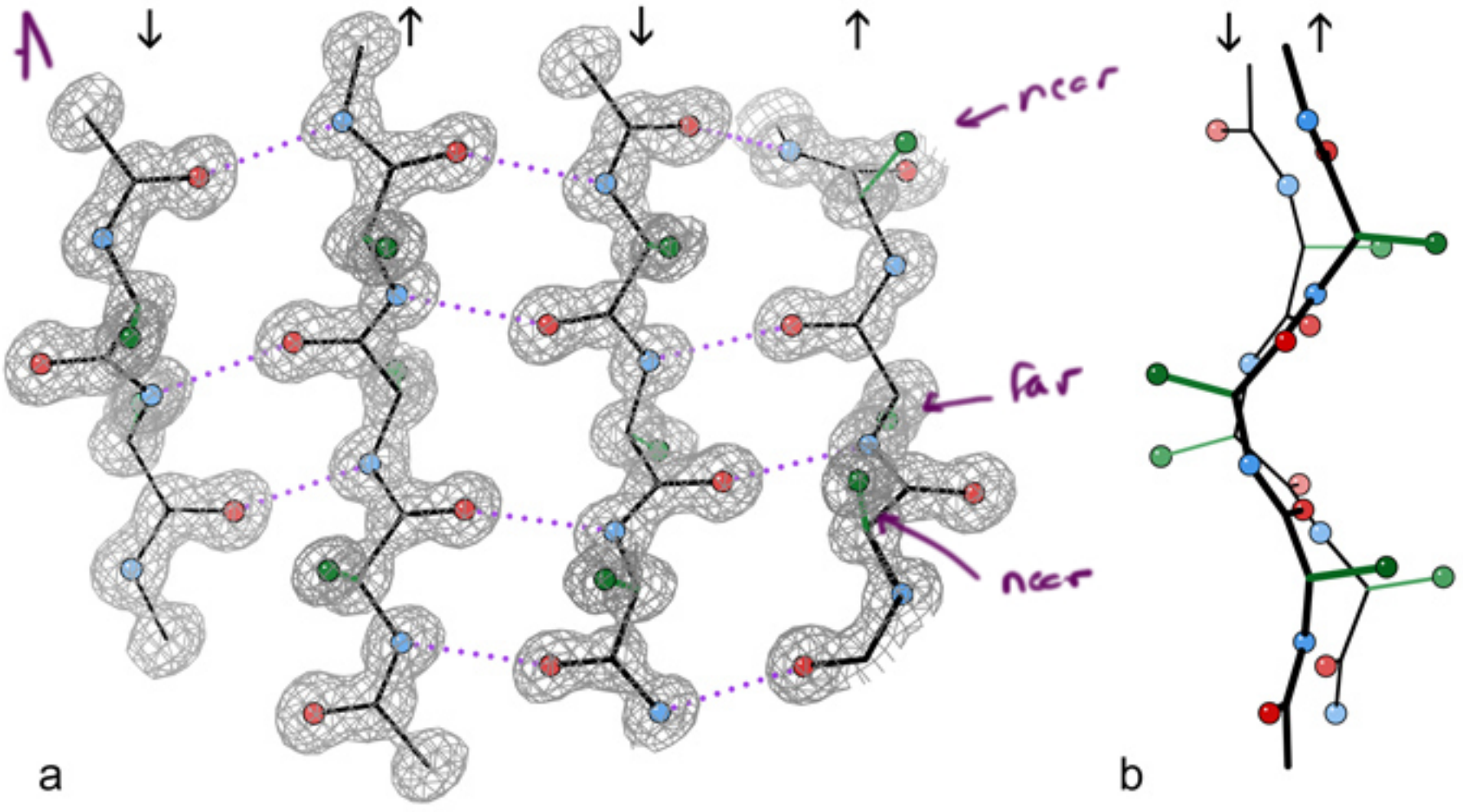




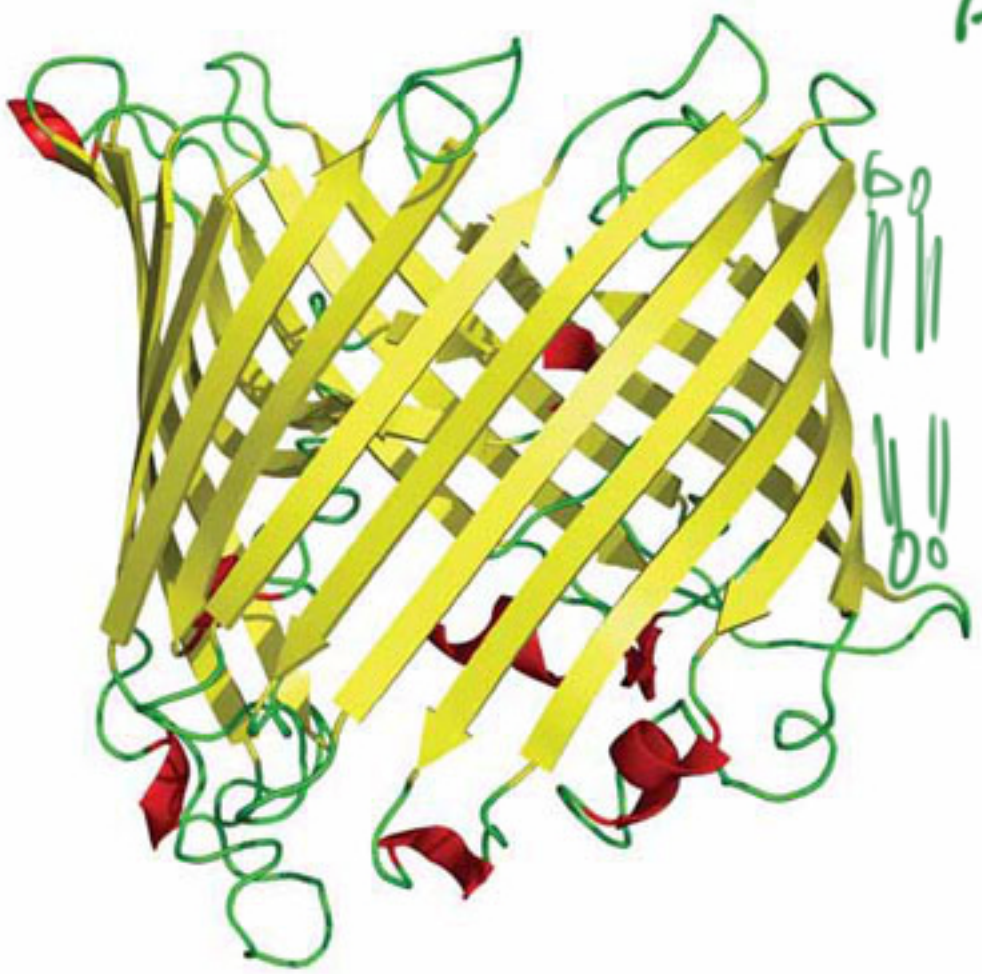
parallel



antiparallel

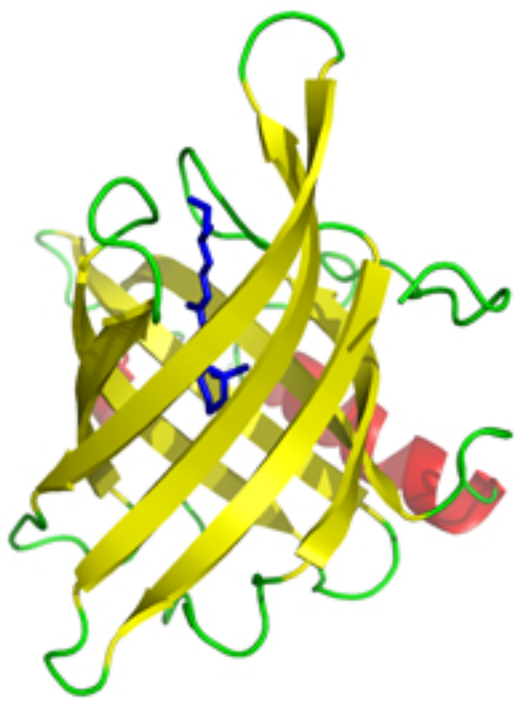

near
far
near
a
b

β Barrels

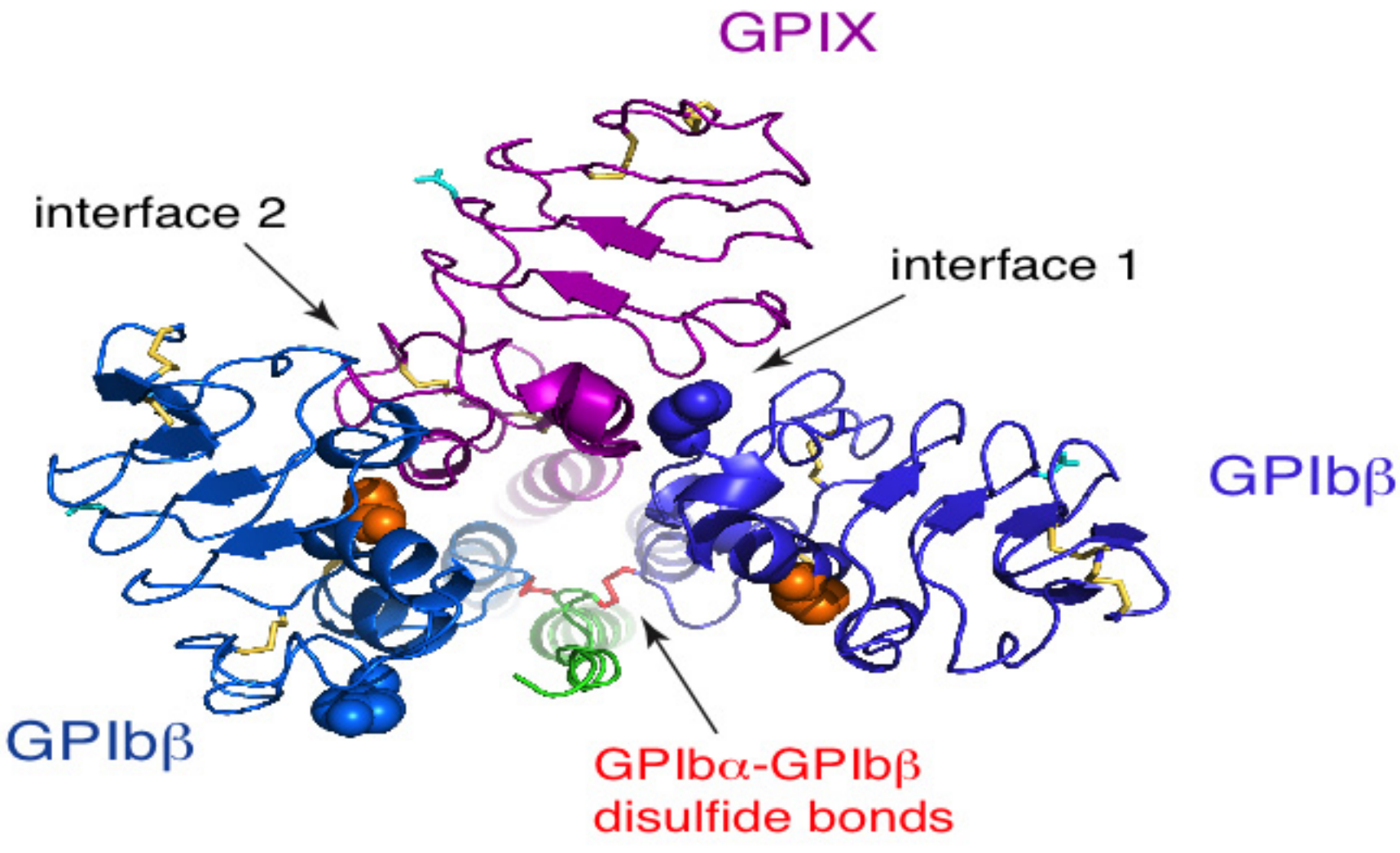


Porin

Hydrophobic outside
Hydrophilic inside



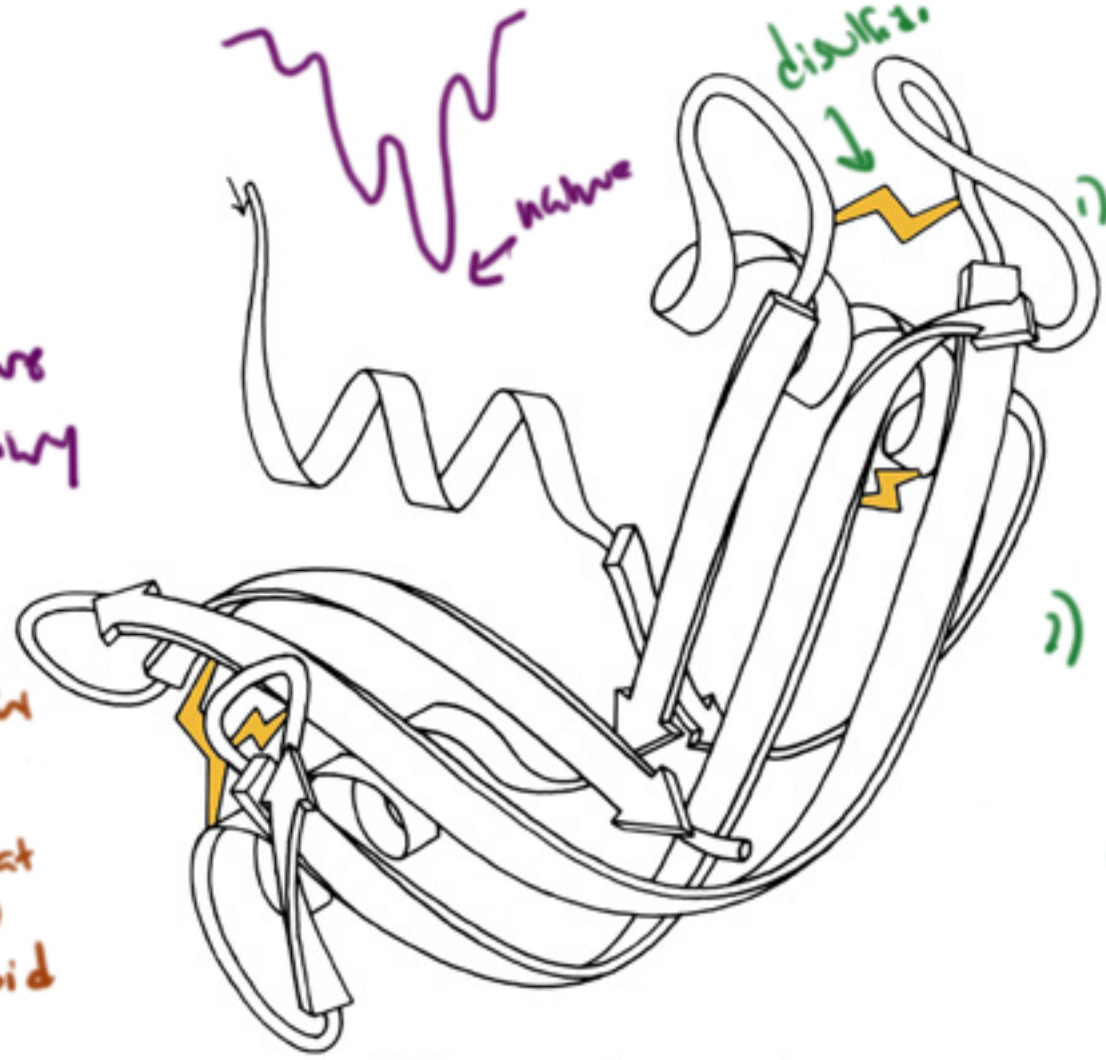
Retinal
Binding
Protein


GPIX
interface 2
interface 1
GPIbβ
GPIbβ
GPIbα-GPIbβ
disulfide bonds

Anfinsen's

Dogma

1) Primary structure determines tertiary structure.



Ribonuclease A

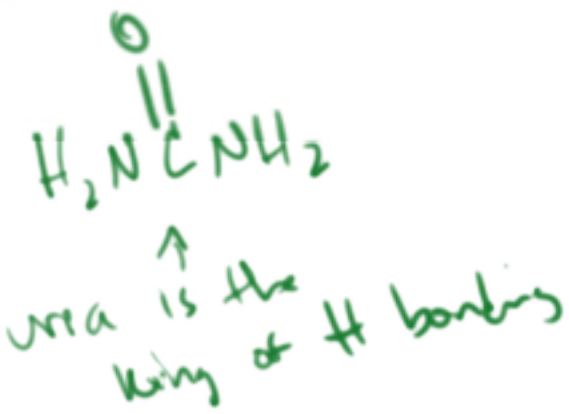
cleaves RNA

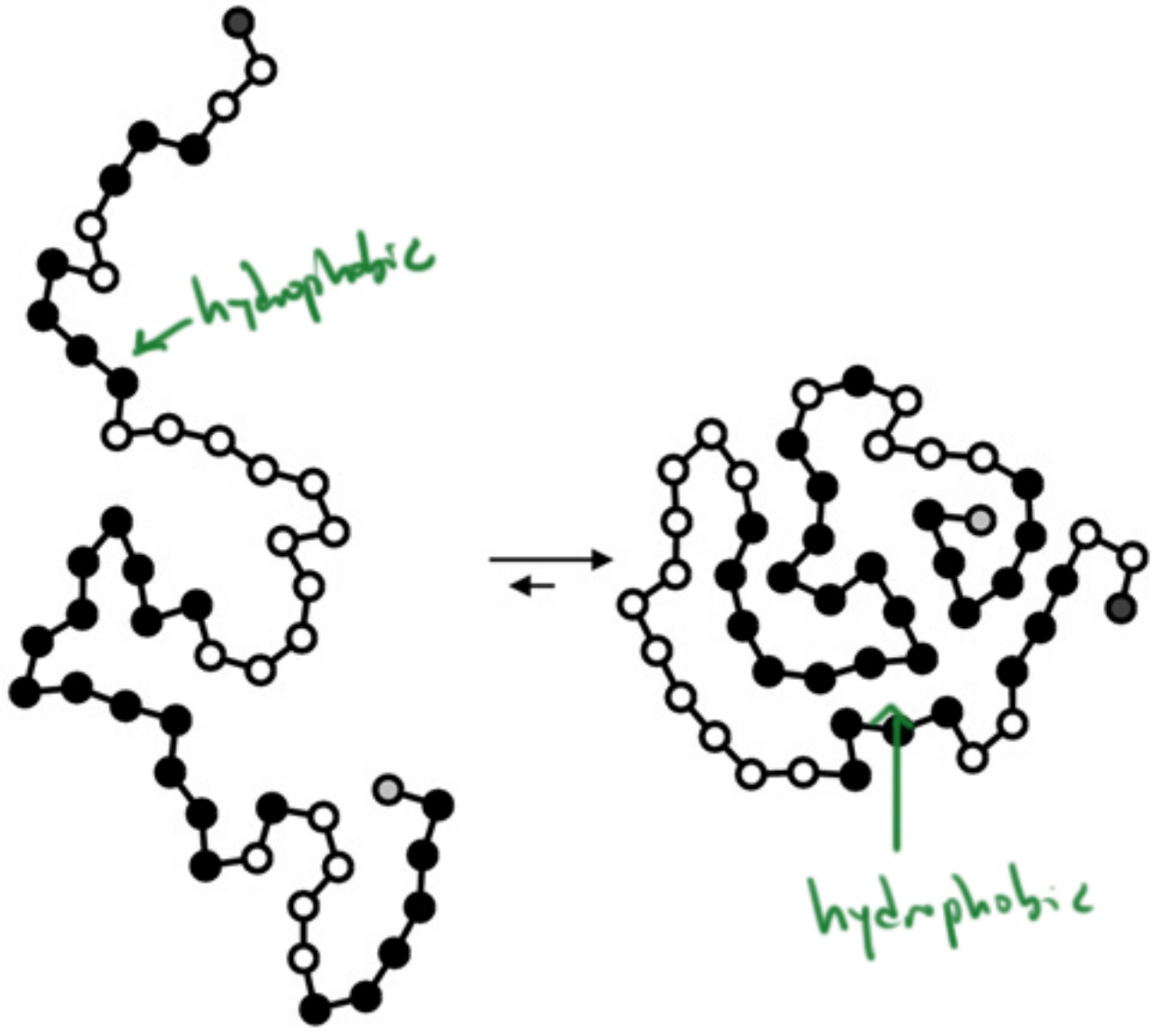
1) Added urea and β mercaptoethanol - enzyme lost activity

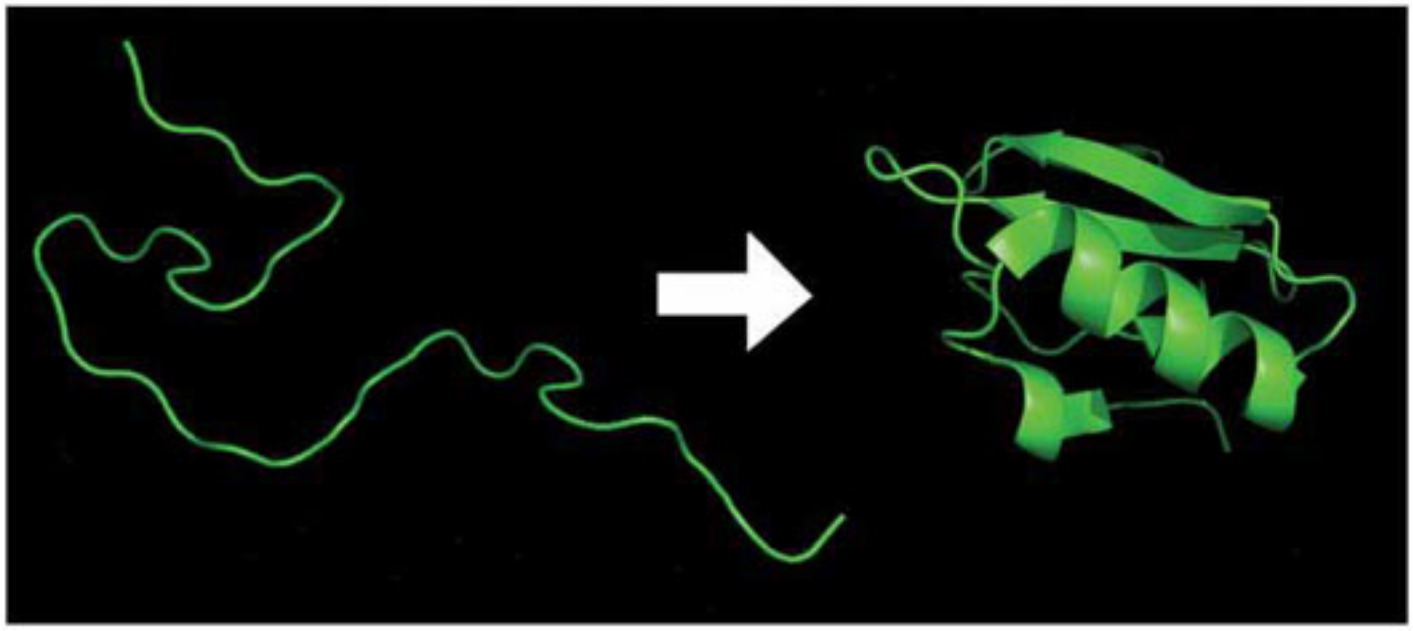
2) Removed these by dialysis - activity was regained

Exceptions-

- often proteins did not refold
- chaperones (heat shock proteins)
- prions & amyloid

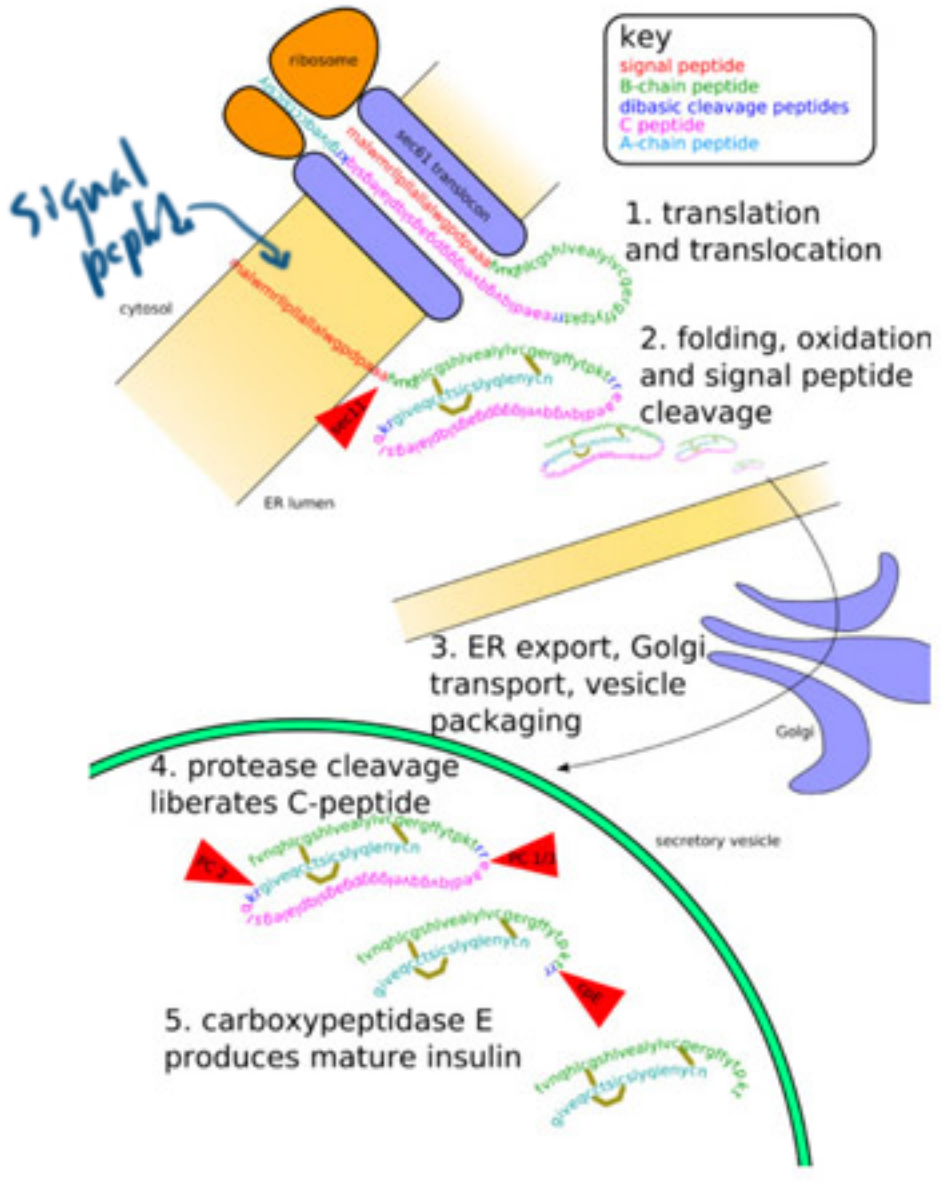


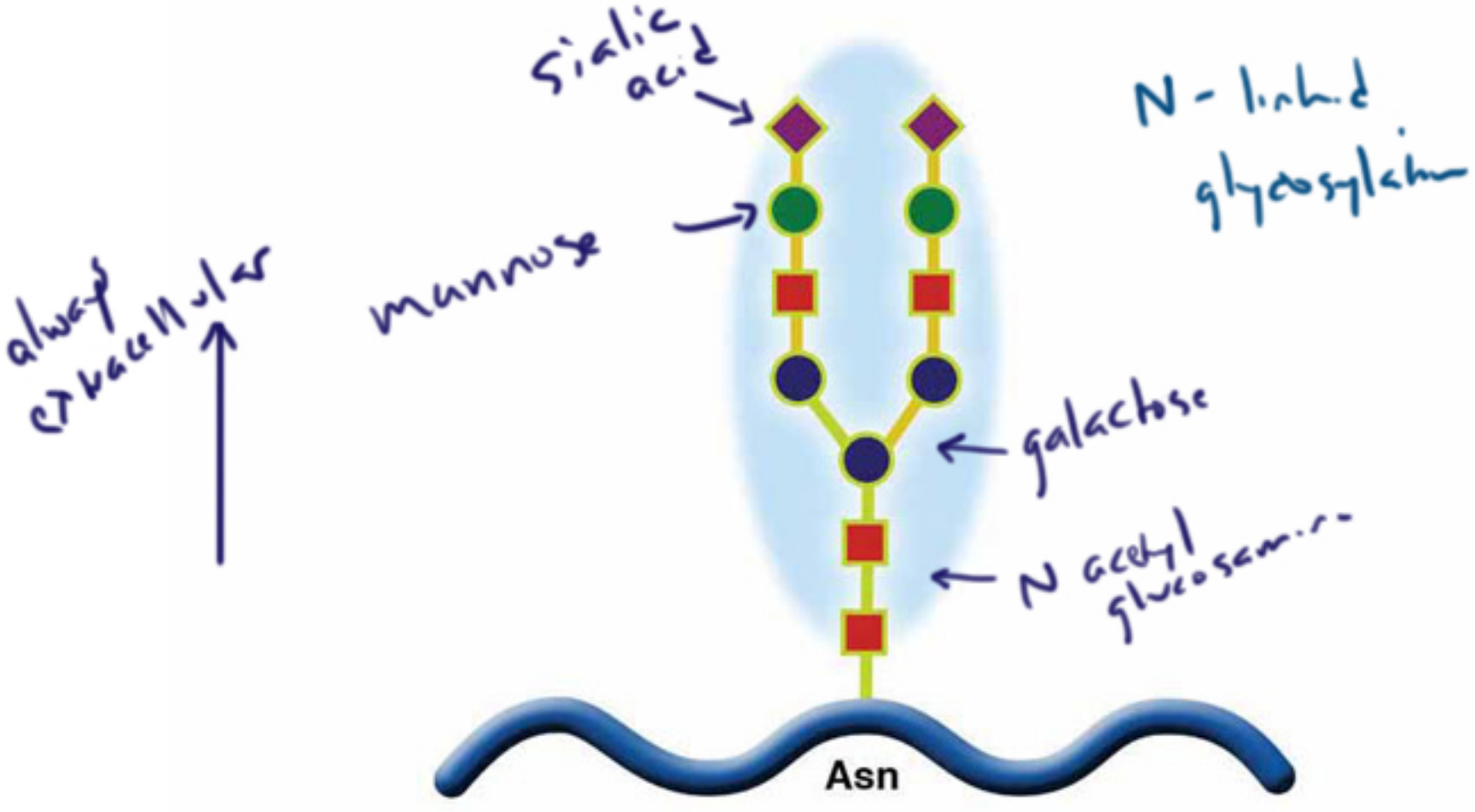

hydrophobic
hydrophobic



insulin synthesis

Post translational modification

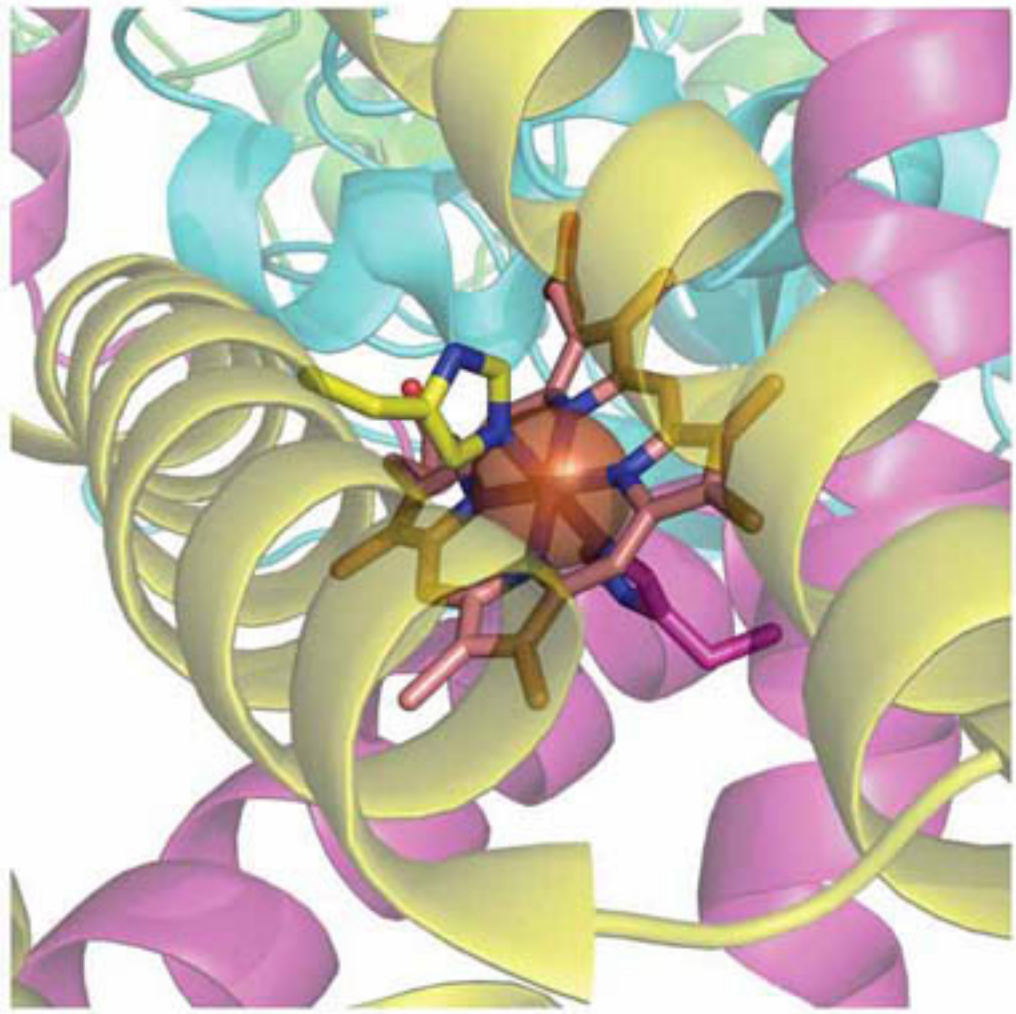



sialic acid
N - linked glycosylation
always extracellular
mannose
galactose
N acetyl glucosamine
Asn

Cofactors

organic cofactor is called a Coenzyme

a permanently attached cofactor is a prosthetic group.



Heme prosthetic group in Complex II (succinate dehydrogenase)