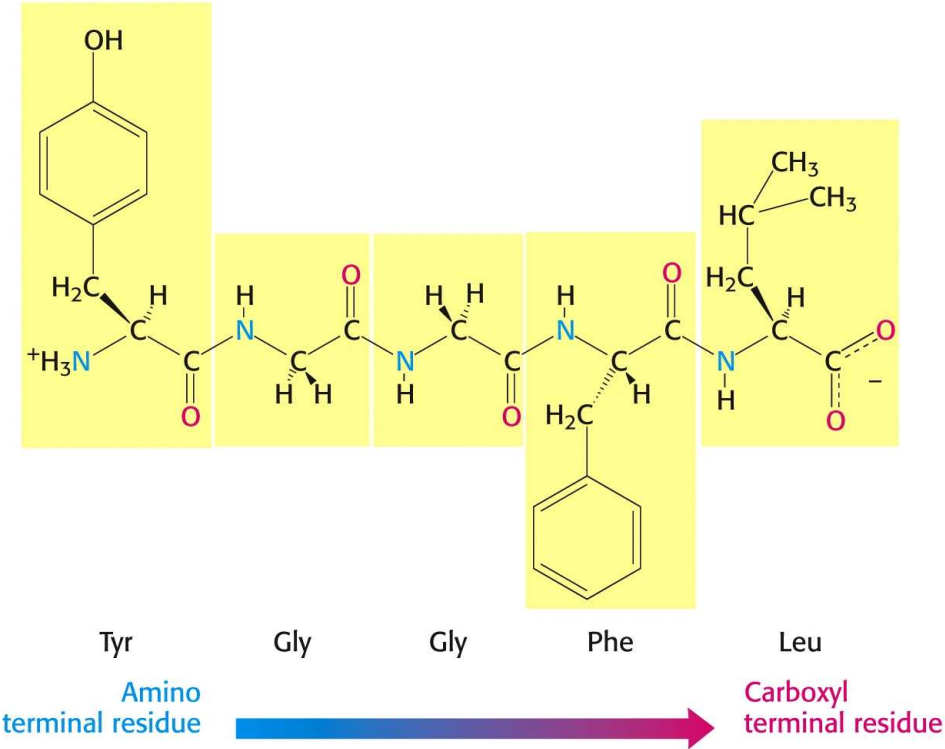
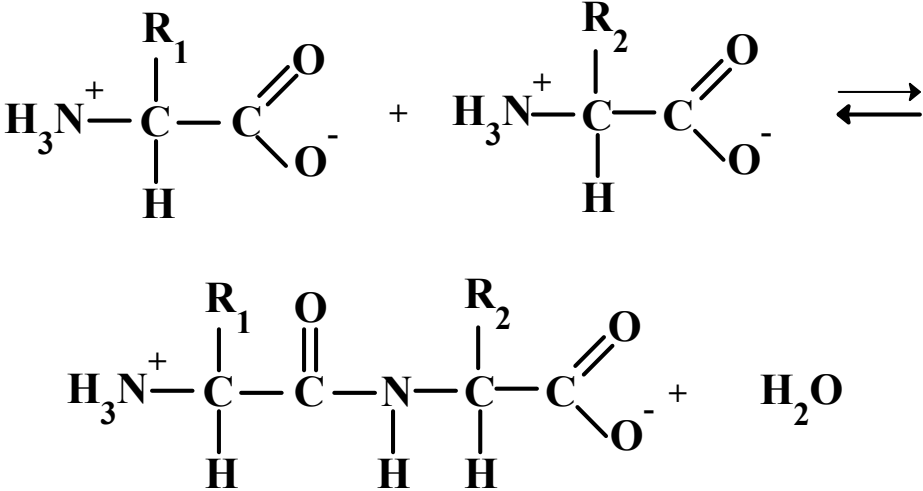


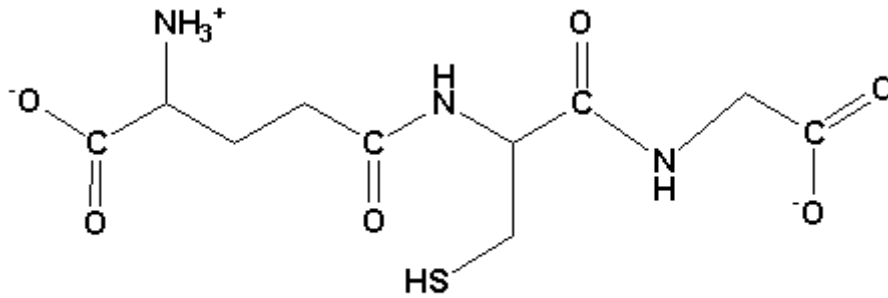
Peptidy



## Přírodní peptidy:

Di - karnosin  
anserin

Tri - glutathion GSH



**Glutathione**

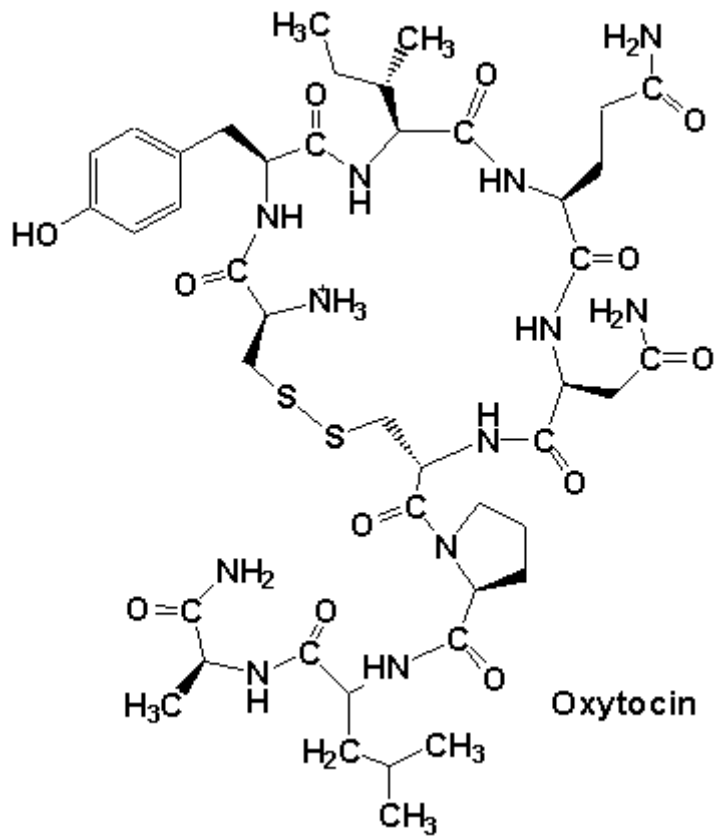
Peptidové hormóny - oxytocin  
vasopresin  
inzulin  
glukagon

Peptidové neuromodulátory - enkefaliny  
endorfiny

Peptidová antibiotika - penicilín  
gramicidin  
valinomycin  
aktinomycin

Peptidové fyto a zootoxiny - neurotoxiny hadů štírů a včel  
mikrocystiny  
falloidin  
amanitin

Polypeptidy - protaminy



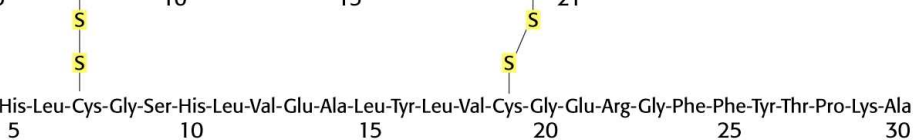
**A chain**

Gly-Ile-Val-Glu-Gln-Cys-Cys-Ala-Ser-Val-Cys-Ser-Leu-Tyr-Gln-Leu-Glu-Asn-Tyr-Cys-Asn



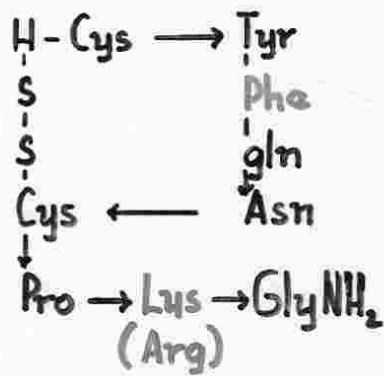
**B chain**

Phe-Val-Asn-Gln-His-Leu-Cys-Gly-Ser-His-Leu-Val-Glu-Ala-Leu-Tyr-Leu-Val-Cys-Gly-Glu-Arg-Gly-Phe-Phe-Tyr-Thr-Pro-Lys-Ala

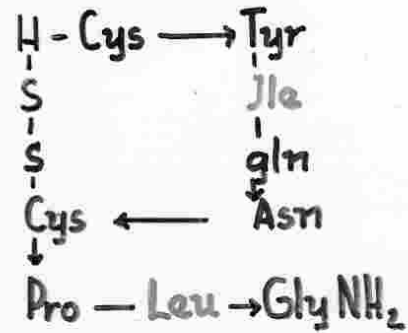


**INSULIN**

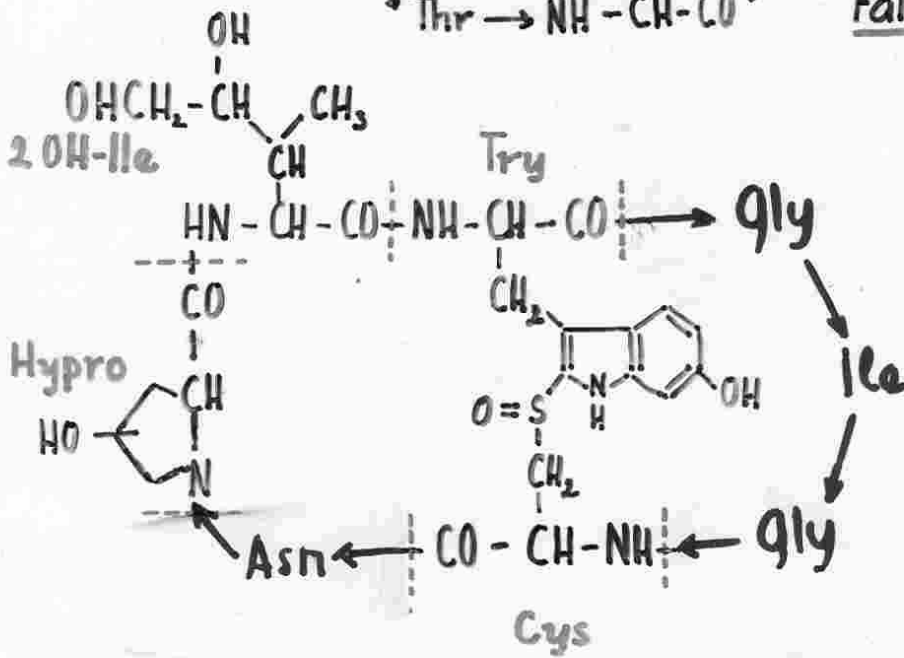
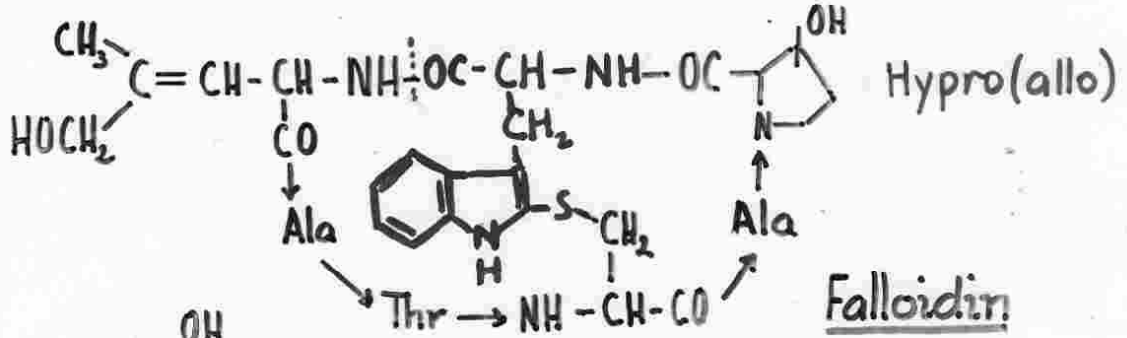
# CYKLOPEPTIDY



Vasopressin

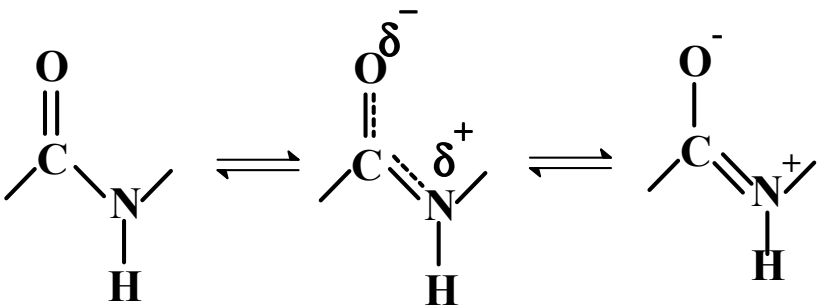
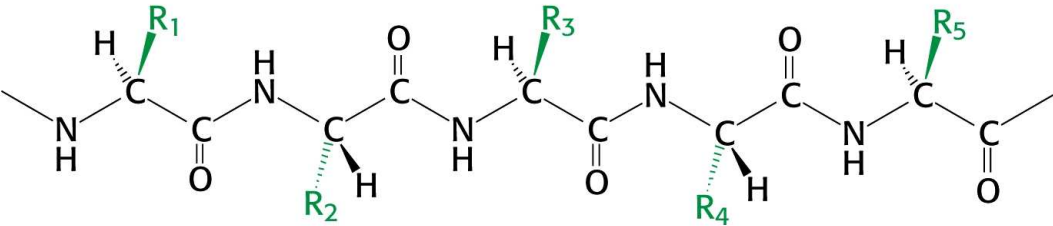


Oxytocin

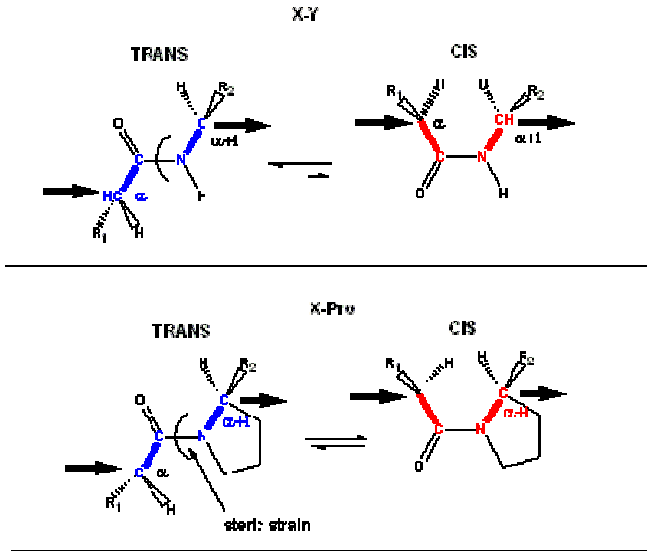


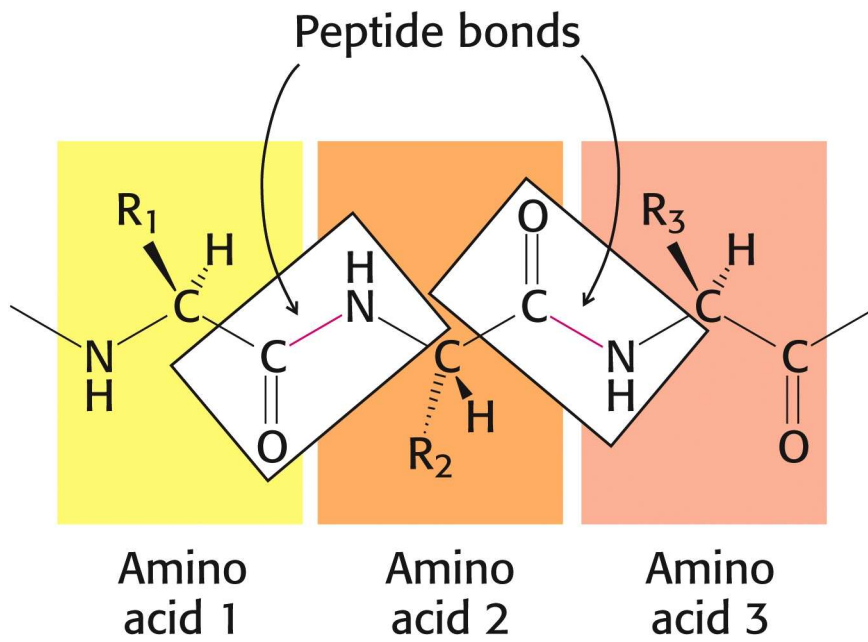
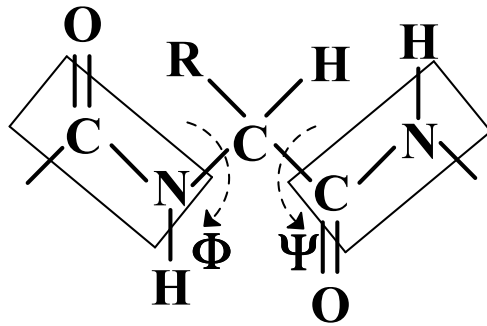
LD<sub>50</sub> (mys) 0,04 mg/kg

Struktura peptidové vazby



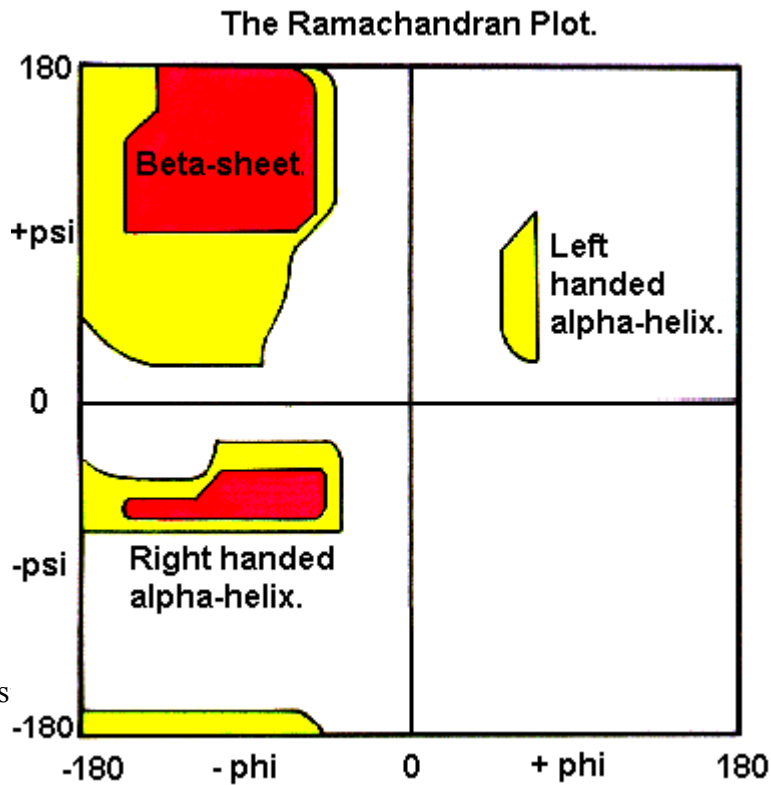
**PEPTIDE BONDS: CIS OR TRANS**





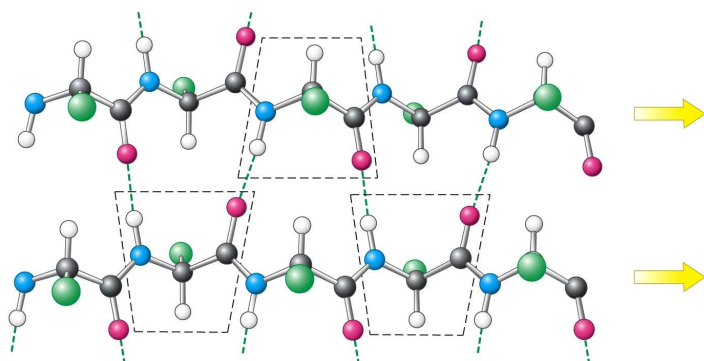
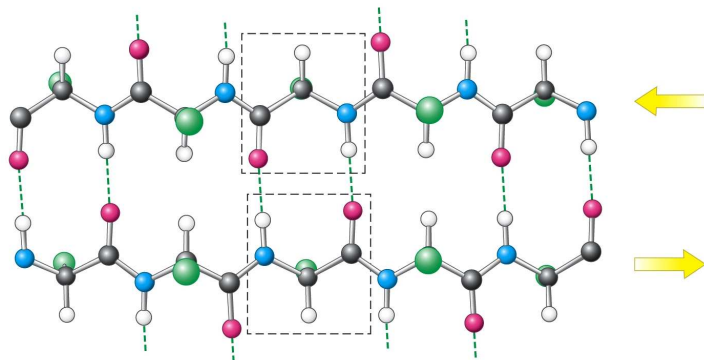
ANIMACE otáčení roviny peptidových vazeb

## Ramachandranův diagram stability sekundárních struktur bílkovin

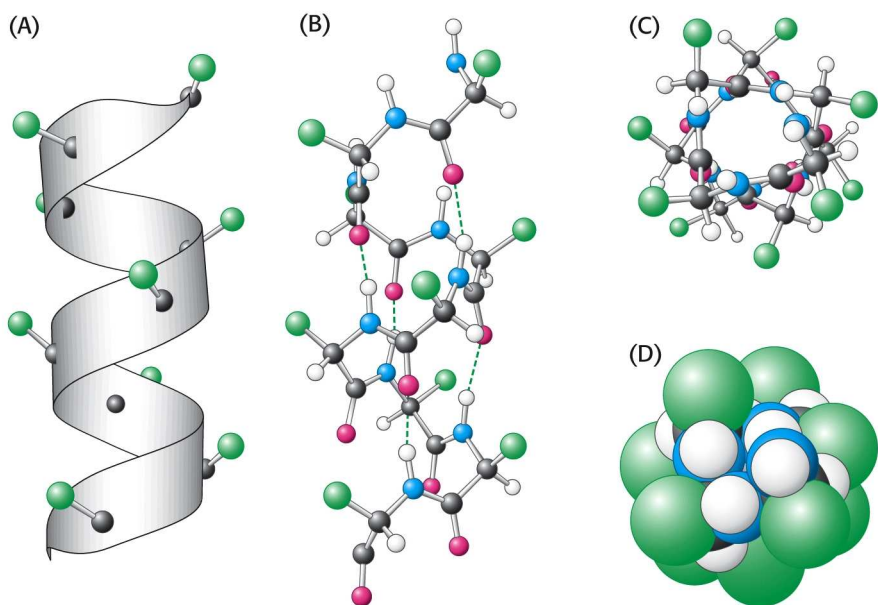


### Typy sekundárních struktur :

- A. Pravidelné** - helikální struktury -  $\alpha$  helix (-56, -47)  
-  $\beta$  struktury - skládaný list - paralelní (-139, +135) a antiparalelní (-119, +113)
- B. Ohybové** -  $\beta$  ohyb
- C. Nepravidelné**

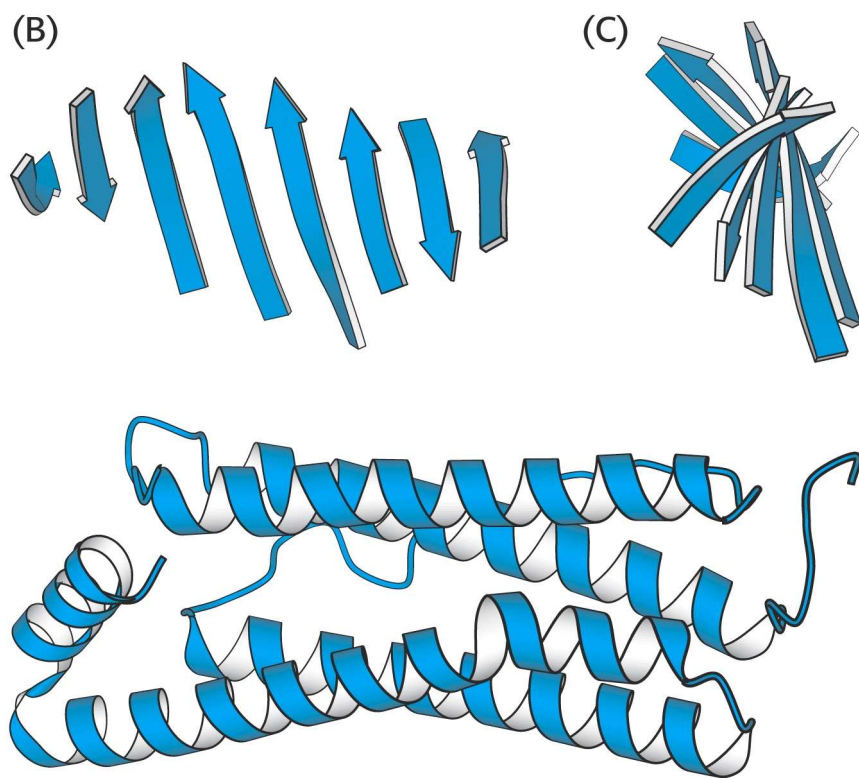


$\beta$ -skládání list – antiparalelní a paralelní

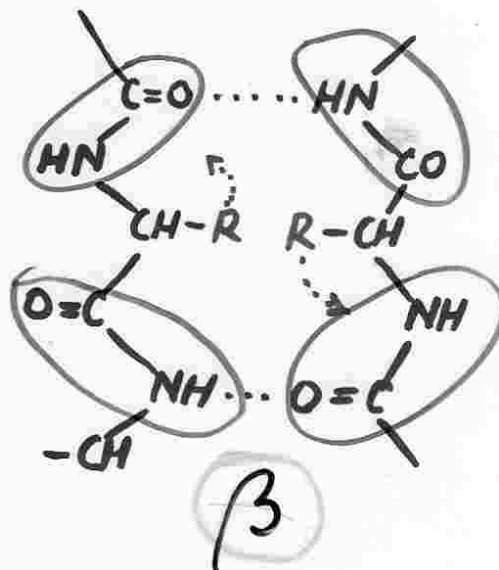
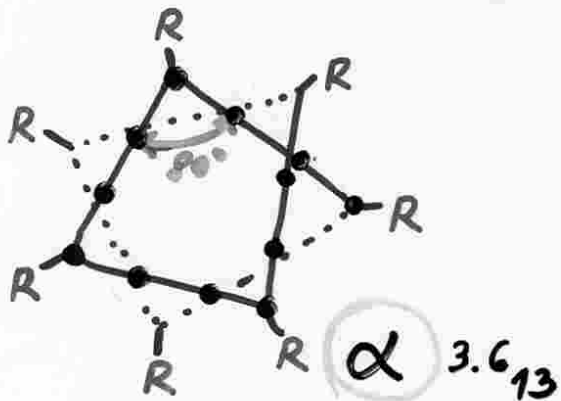
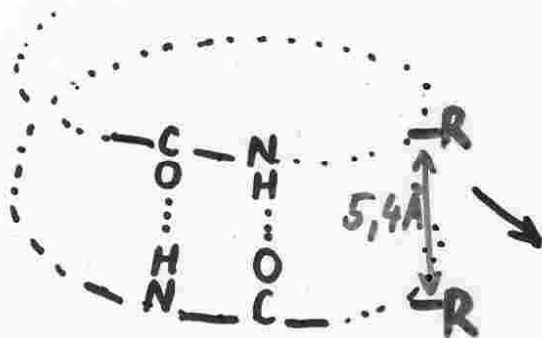
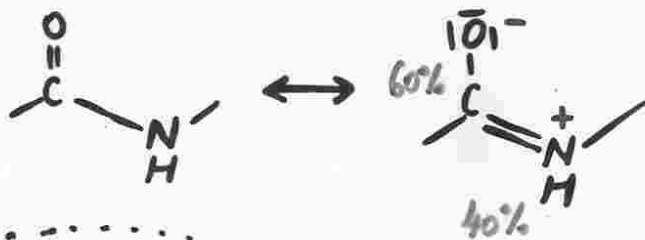
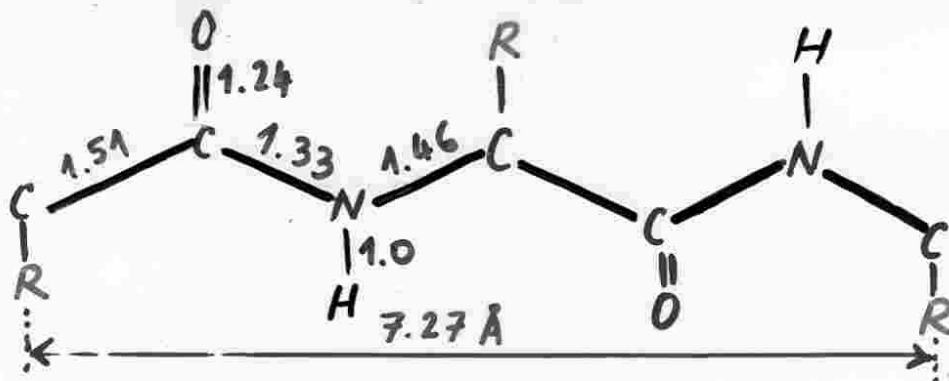


Modely  $\alpha$ -šroubovice





Schematická znázornění struktur skládaného listu a šroubovice

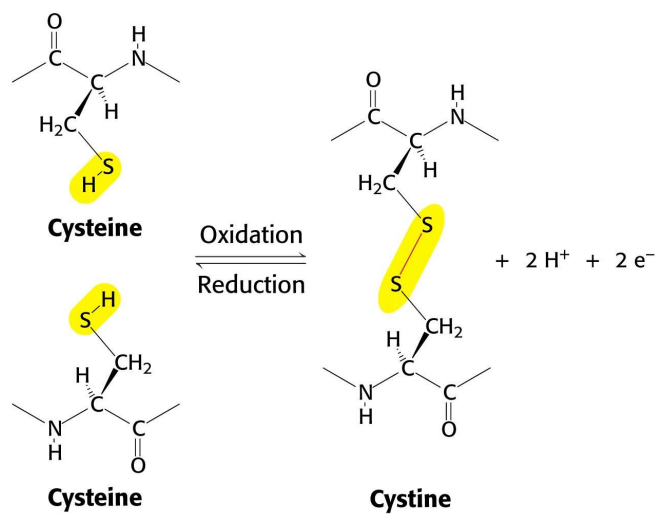
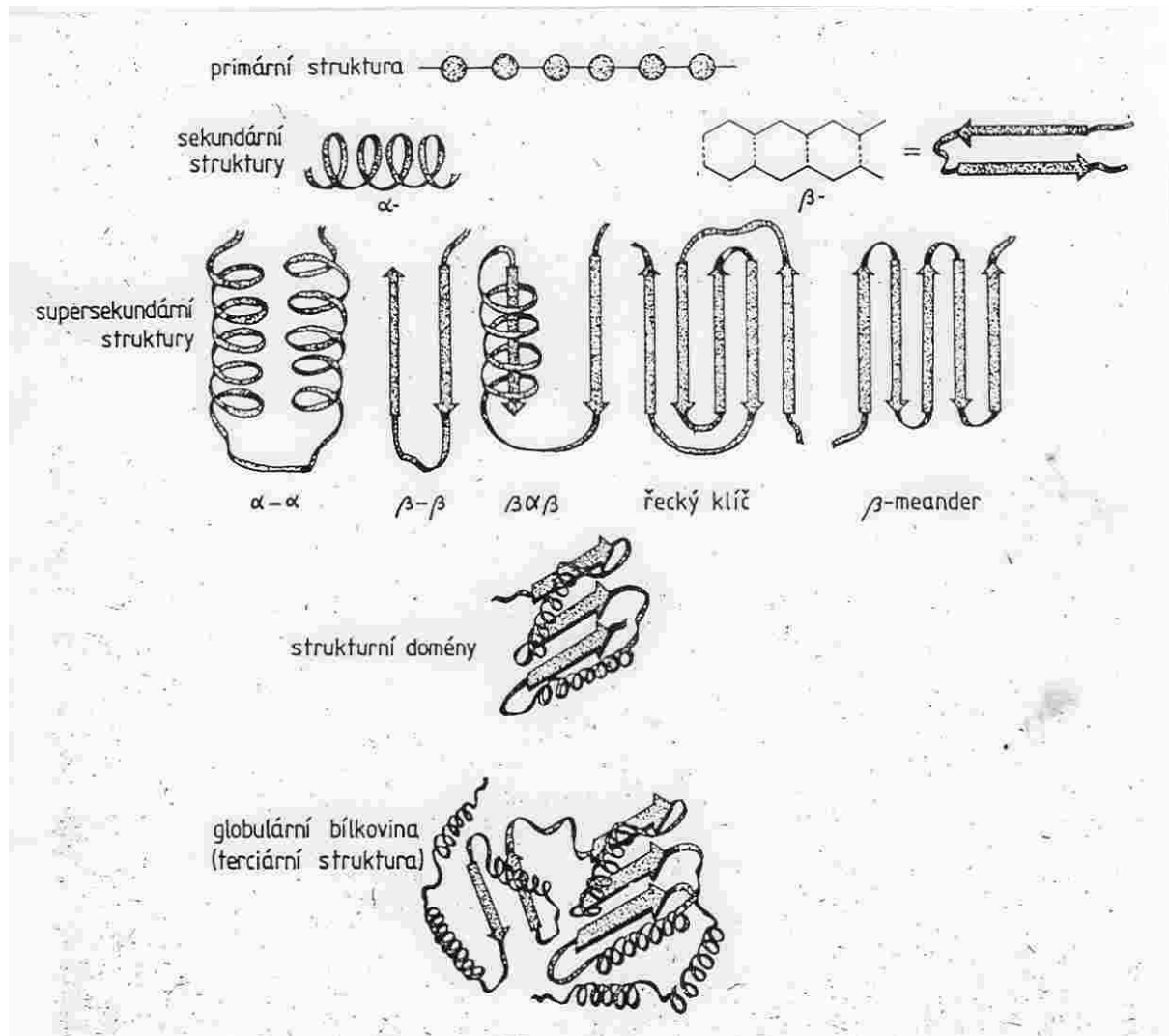


## **Terciární struktura**

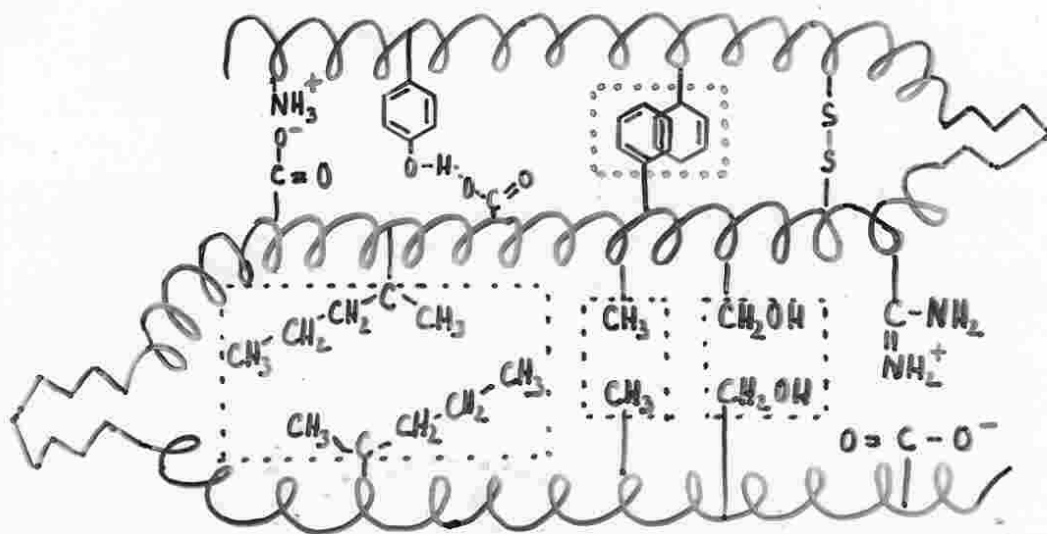
1. Iontové interakce
2. Dipolové interakce
3. Vodíkové můstky
4. Hydrofobní interakce

## 5. Bisulfidické můstky

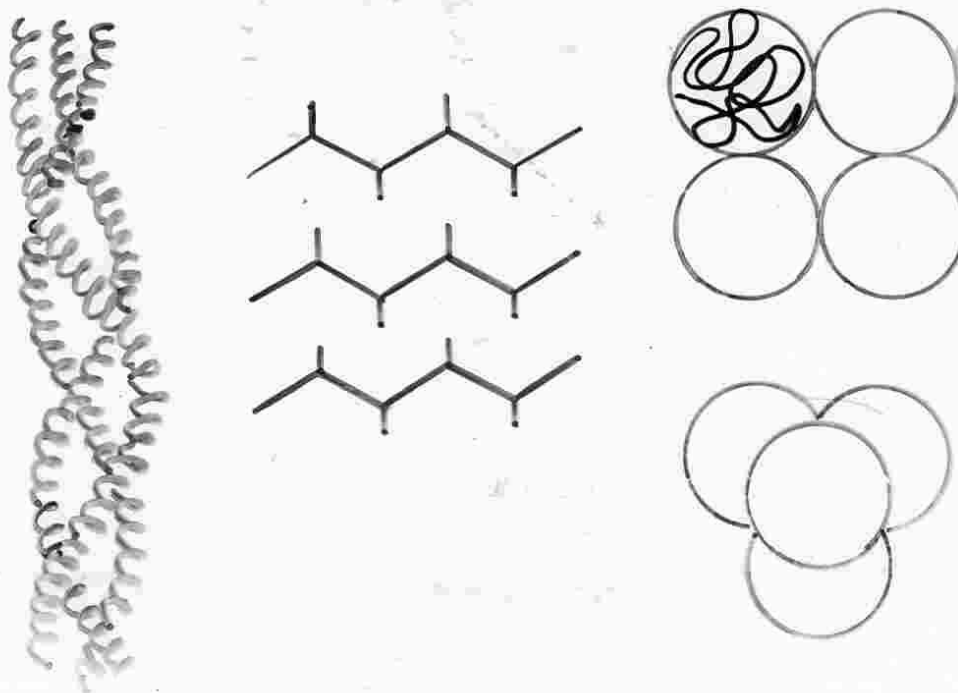
### Strukturní motivy - domény



## TERCIARNÍ STRUKTURA (Anfinsen) 1957



## KVARTERNÍ STRUKTURY :



### **Kvarterní struktura**

- Podjednotkové složení** - nekovalentní spojení - vodíkové můstky  
- kovalentní spojení - bisulfidické můstky

## KONFORMACE

Skládání řetězce, principiální úloha primární struktury, vliv prostředí, změny konformace.

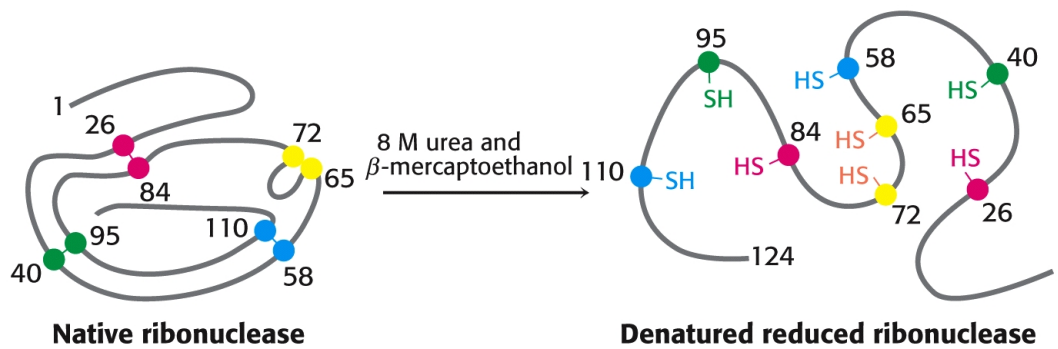
Bílkovina v roztoku, chování, denaturace.

**Denaturace**

- fyzikální faktory - T, záření, tlak,
- chemické faktory - pH, organická rozpouštědla, detergenty, těžké kovy, močovina,

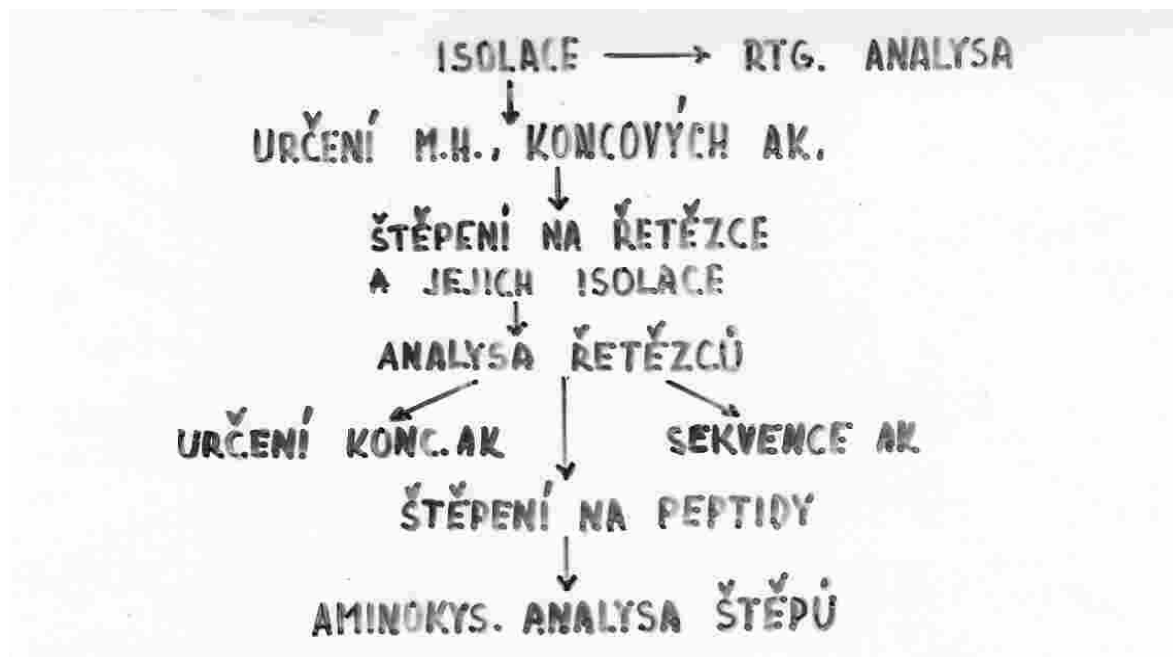
**Denaturace**

- reverzibilní - renaturace
- ireverzibilní

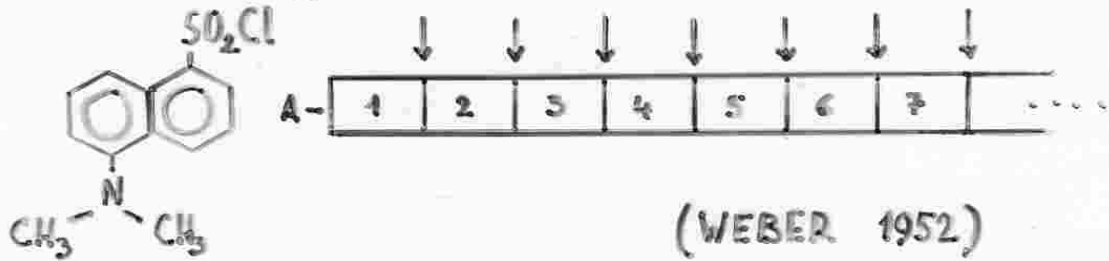
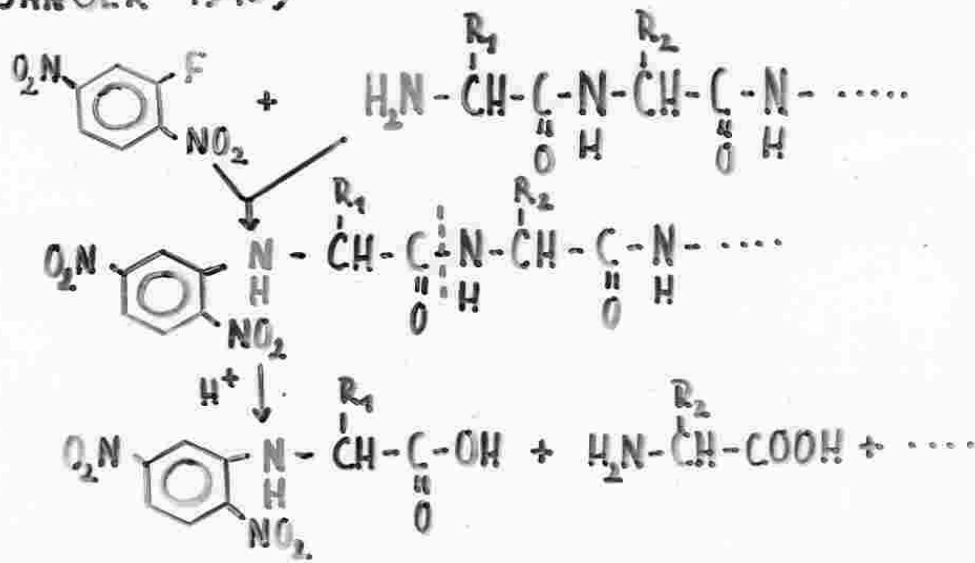


Metody studia bílkovin:

- Isolace – metody dle smyslu (čisté nativní bílkoviny pro studium vlastností event. farmakologii, hrubé izolace pro průmysl apod.)
- Analýza – elfo, spektrální, RTG, NMR aj.



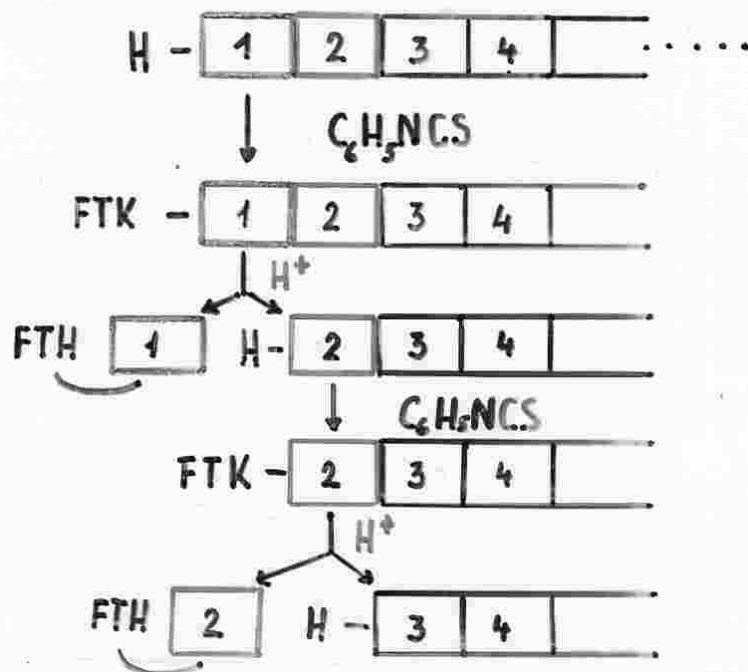
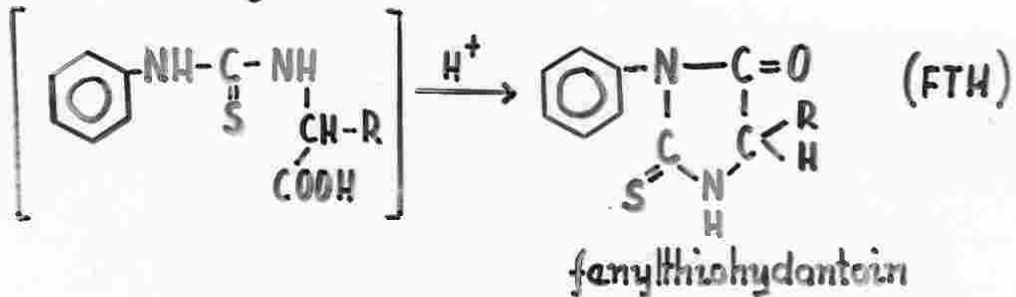
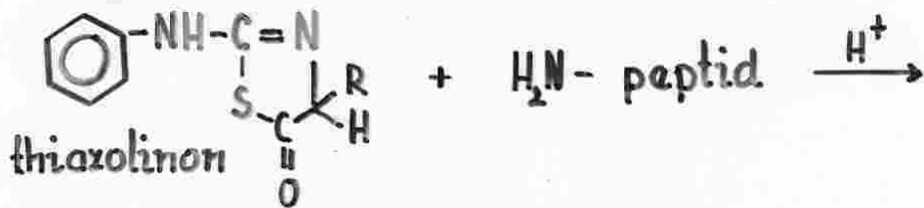
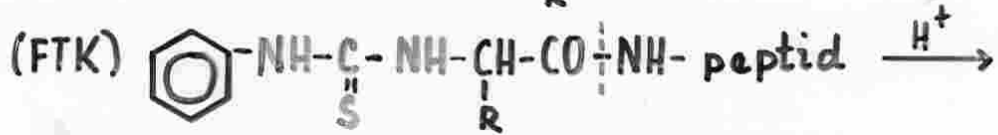
(SANGER 1945)

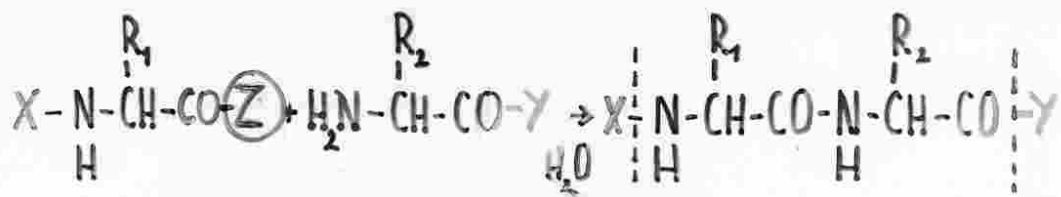


(WEBER 1952)



# EDMANNOVA METODA




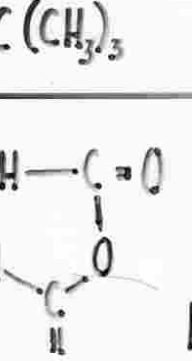




X, Y = chránicí skupiny

Z = aktivace karboxylu: -Cl, -N<sub>3</sub>, -O-C<sub>6</sub>H<sub>4</sub>-NO<sub>2</sub>

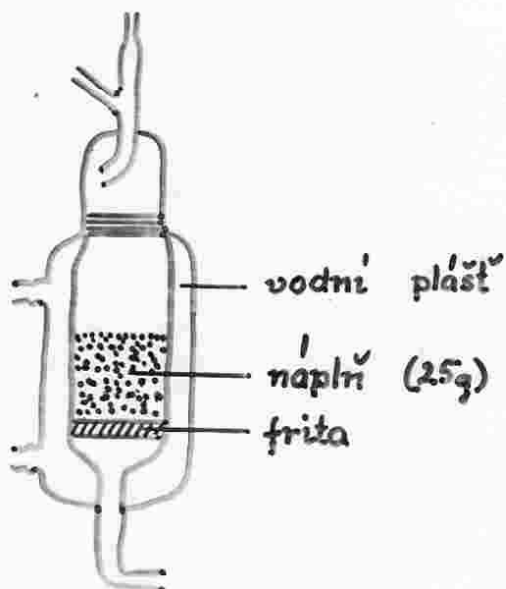
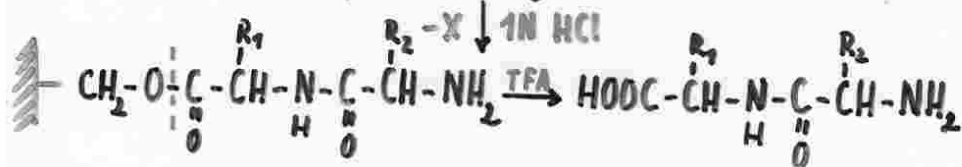
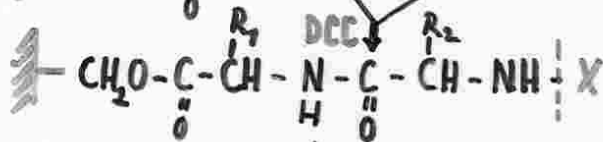
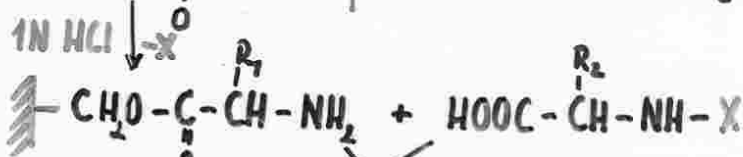
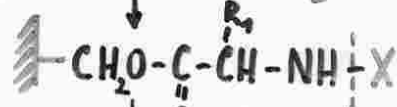
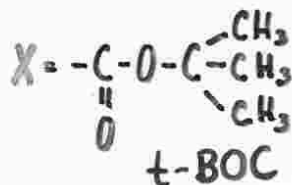
## PŘEHLED CHRÁNÍCÍCH SKUPIN DLE KLESAJÍCÍ STABILITY

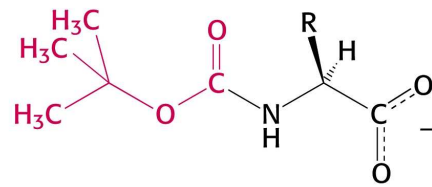
| X  |                  | Y   |
|--|------------------|---|
| CH <sub>3</sub> -  -SO <sub>2</sub> - | Du Vigneaud      | -OCH <sub>3</sub> , -OC <sub>2</sub> H <sub>5</sub>   |
| C <sub>6</sub> H <sub>5</sub> CH <sub>2</sub> -O-CO-<br>(subst. urethan)   | Bergmann<br>1932 | -OCH <sub>2</sub> - <br>-OC(CH <sub>3</sub> ) <sub>3</sub> |
| (C <sub>2</sub> H <sub>5</sub> ) <sub>3</sub> C-O-CO-  |                  |   |
|  -S-                                  |                  | <br>Merck<br>1966  |

# MERRIFIELD 1965

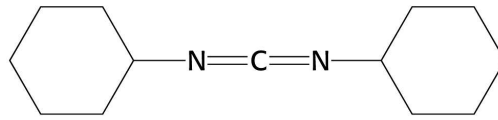


triethylamin

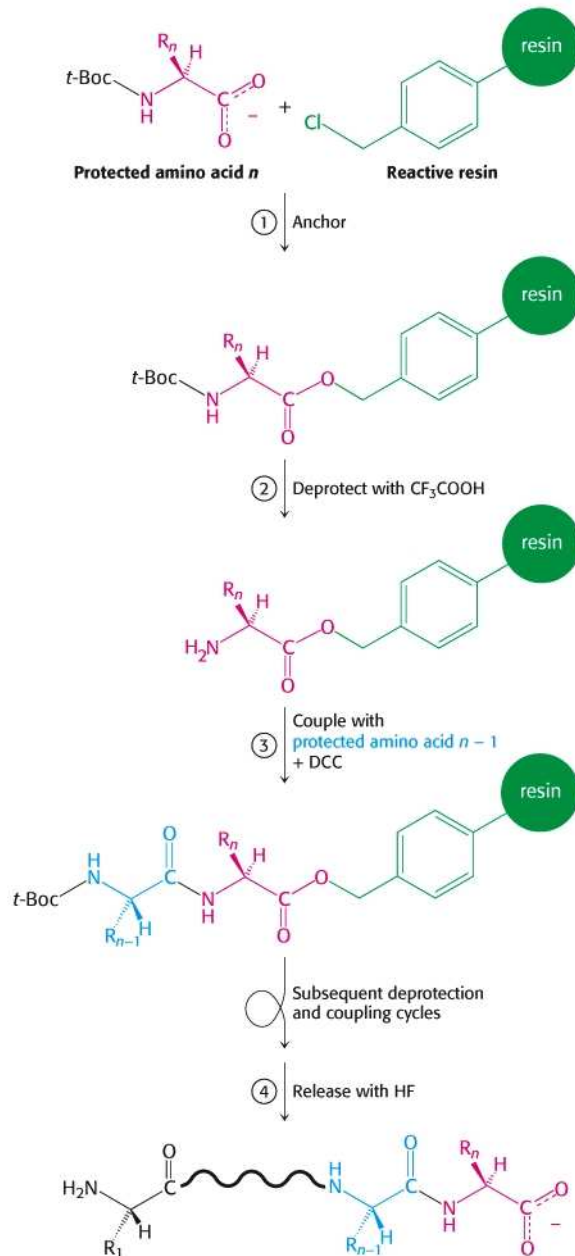




***t*-Butyloxycarbonyl amino acid  
(*t*-Boc amino acid)**



**Dicyclohexylcarbodiimide  
(DCC)**



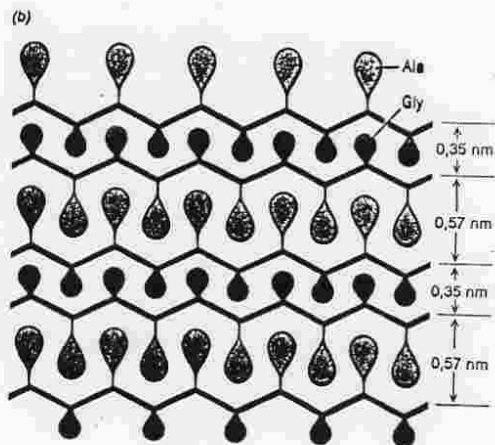
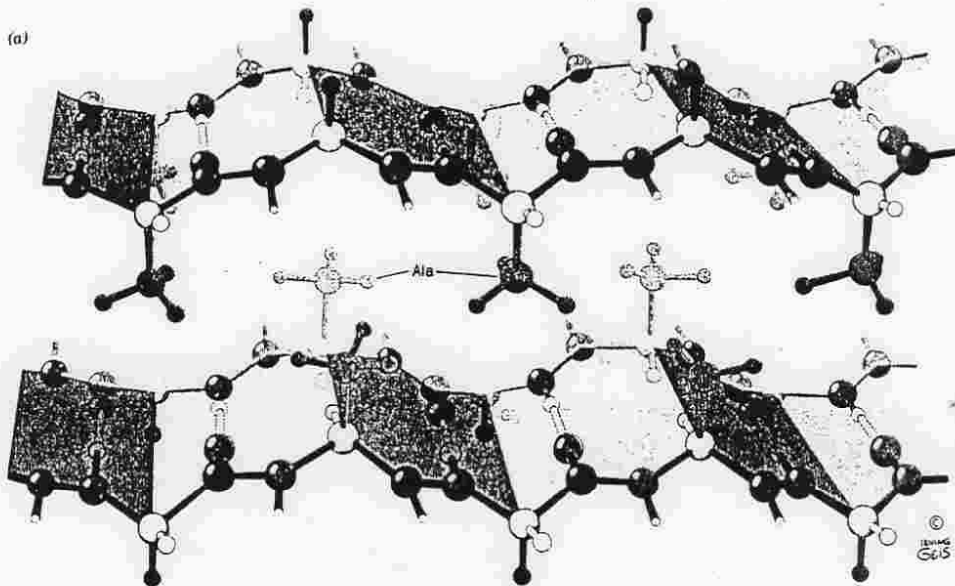
Funkce bílkovin a příklady:

- strukturní
- katalytická
- transportní
- signální
- obranné

Fibrilární bílkoviny (strukturní funkce):

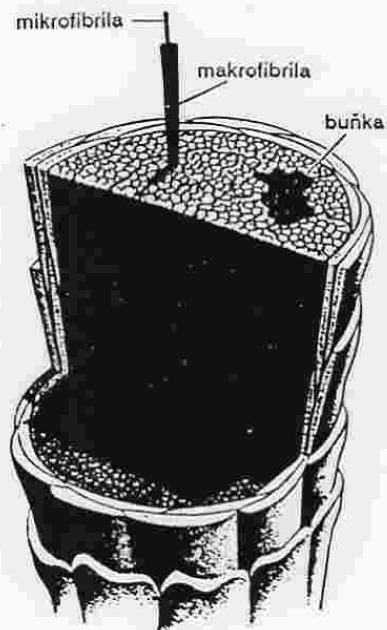
Skupina kolagenu:

# Struktura $\beta$ -keratinu – fibroin z hedvábí

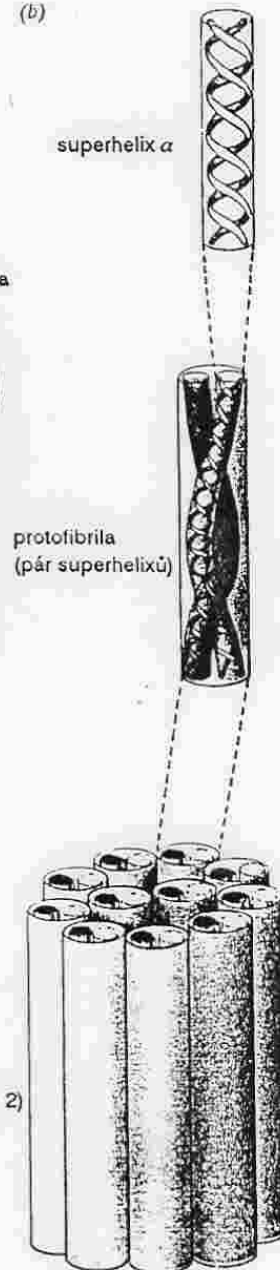


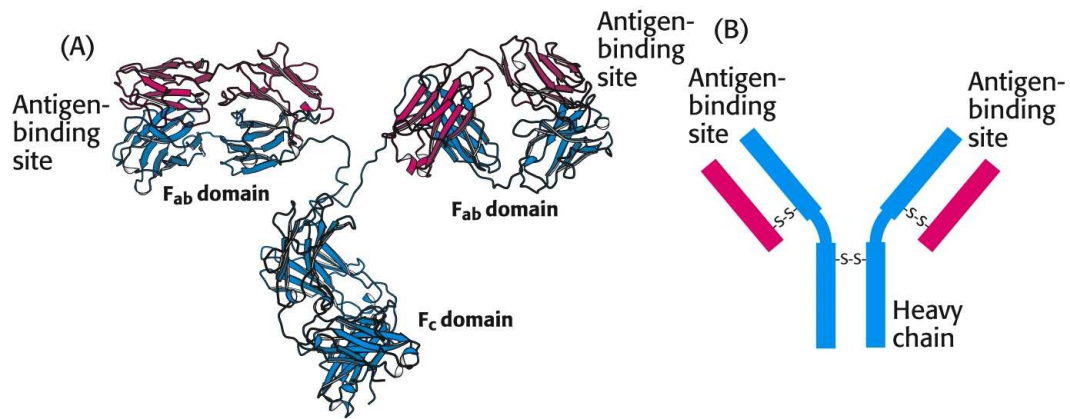
# Struktura $\alpha$ -keratinu – lidský vlas

(a)



(b)





Imunoglobulin G - prostorový model (A) a plošné schema (B).

Antigen x Imunogen

Funkce in vivo – přirozený systém

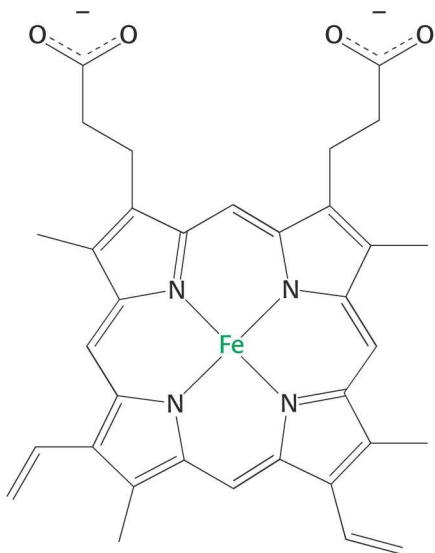
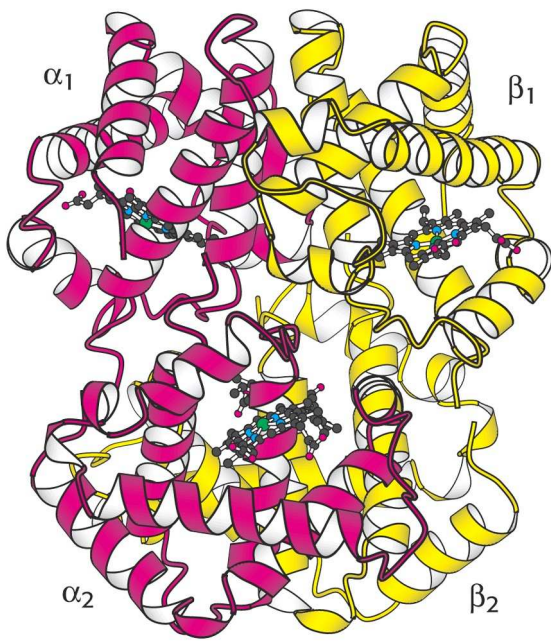
- část složitého mechanismu, funkce spíše signální, aglutinace (erytrocyty)
- indukovaná syntéza, energetická náročnost, regulace
- rozpoznávací schopnost, specificita
- kapacita
- poruchy

Funkce aplikovaná

- imunoanalytické metody
- imunoseparace
- příprava protilátek – polyklonální, monoklonální

HEMOGLOBIN





**Heme**  
(Fe-protoporphyrin IX)

