

snímek 1

NUKLEOVÉ KYSELINY

MISCHER – nukleín (1868 – 1869)

Složení :

- Dusíkaté báze – purinové, pyrimidinové
- Sacharid – ribosa, deoxyribosa
- H_2PO_4

snímek 2

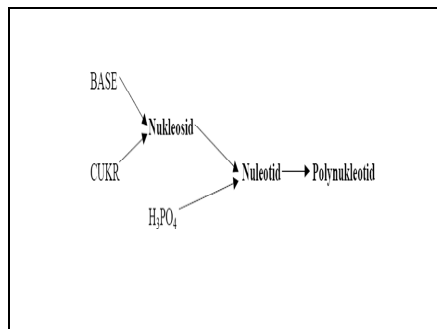
Funkce :

DNA – nositel genetické informace

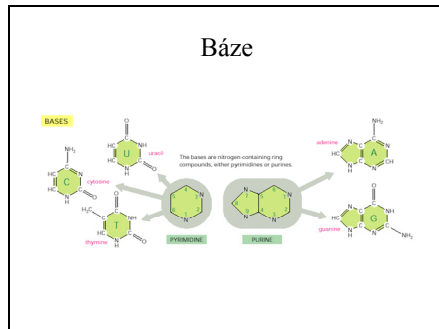
- Vův
- Prokaryota – cytoplazma
- Eukaryota – jádro, mitochondrie, chloroplasty

RNA – realizace genetické informace (u RNA virů i nositel genetické informace)

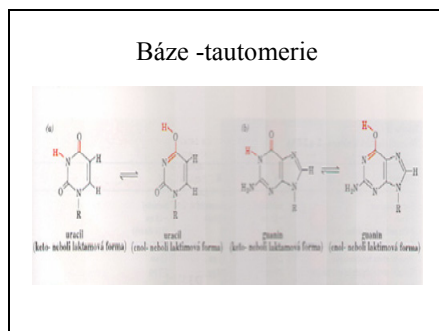
snímek 3



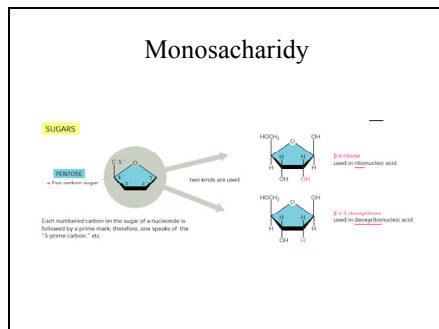
snímek 4



snímek 5



snímek 6



snímek 7

Nukleosid

BASIC SUGAR LINKAGE

Argynotic base

The base is linked to the same carbon (C1) used in sugar-sugar bonds.

snímek 8

Kyselina fosforečná

PHOSPHATES

The phosphates are normally joined to the C3 hydroxyl of the ribose or deoxyribose sugar (designated 5'), Mono-, di-, and triphosphates are common.

as in AMP

as in ADP

as in ATP

The phosphate makes a nucleotide negatively charged.

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Nukleotid

NUCLEOTIDES

A nucleotide consists of a nitrogen-containing base, a five-carbon sugar, and one or more phosphate groups.

PHOSPHATE

BASE

SUGAR

Nucleotides are the subunits of the nucleic acids.

snímek 10

Názvosloví

BASE + SUGAR = NUCLEOSIDE

BASE + SUGAR + PHOSPHATE = NUCLEOTIDE

BASE	NUCLEOSIDE	ABBR.
adenine	adenosine	A
guanine	guanosine	G
cytosine	cytosine	C
uracil	uridine	U
thymine	thymidine	T

Nucleotides are abbreviated by three capital letters. Some examples follow:
 AMP = adenosine monophosphate
 dAMP = deoxyadenosine monophosphate
 UDP = uridine diphosphate
 ATP = adenosine triphosphate

snímek 11

Polynukleotid – nukleová kyselina

phosphodiester linkage

example: DNA

snímek 12

Struktura a funkce DNA

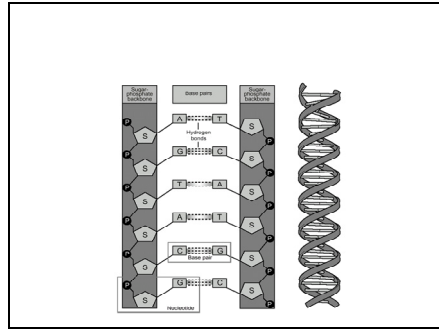
A,T,G,C + deoxyribose

Primární struktura – sekvence bází

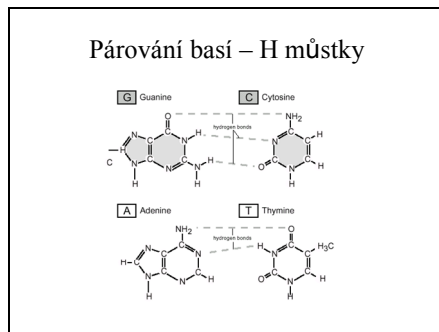
Sekundární struktura – Watson, Crick (1953) – dvojitá šroubovice

- Chragaffovy pravidla – poměr bází v DNA
 $A+G=T+C$ $A=T$ $G=C$ $A+C=G+T$
- Donohue – báze v tautomerických ketoformách
- Franklinová – RTG difrakční analýza

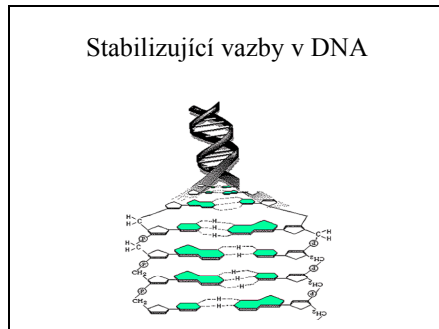
snímek 13



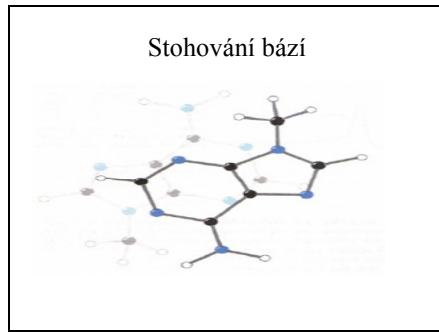
snímek 14



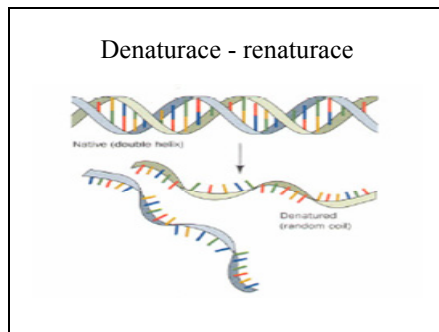
snímek 15



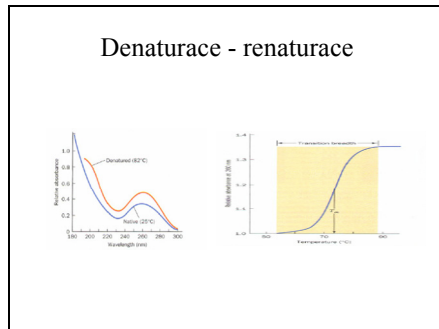
snímek 16



snímek 17



snímek 18

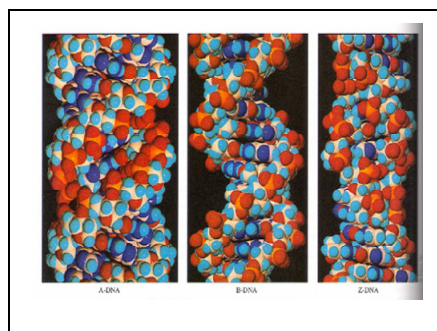


snímek 19

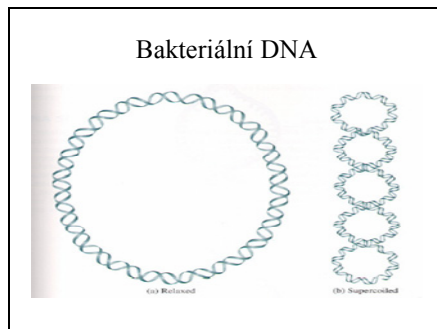
Formy DNA

- **B - DNA** - nativní 92 % H₂O, Na⁺
pravotočivá - 10 párů bázi na závit
- **A - DNA** - 75 % H₂O, rovina bázi 20°
pravotočivá - 11 párů bázi na závit
- **Z - DNA** - d(CGCCCG)
levotočivá - 12 párů bázi na závit

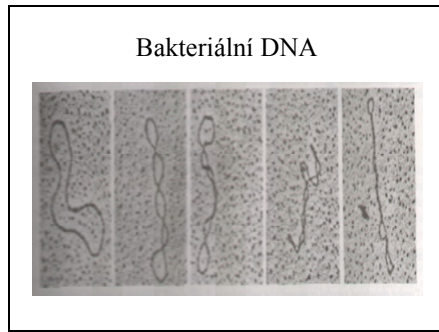
snímek 20



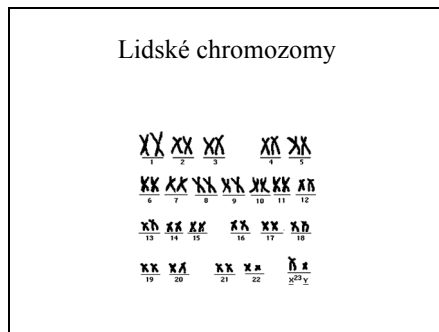
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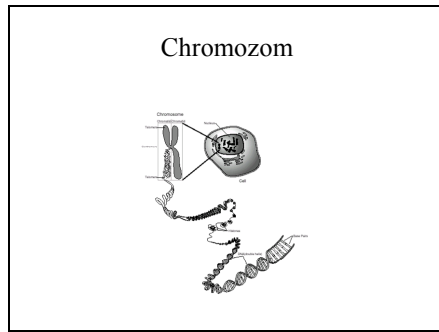
snímek 22



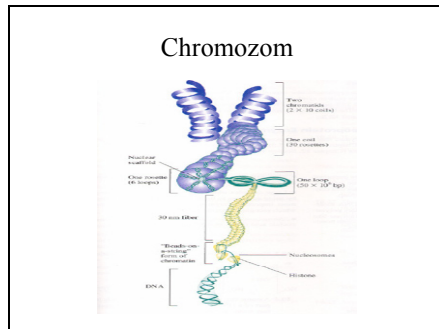
snímek 23



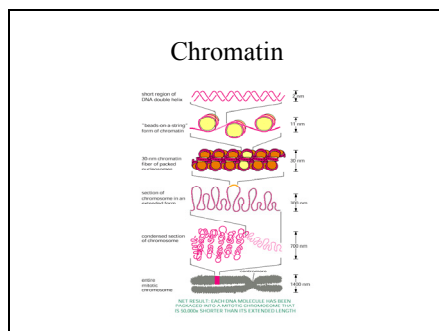
snímek 24



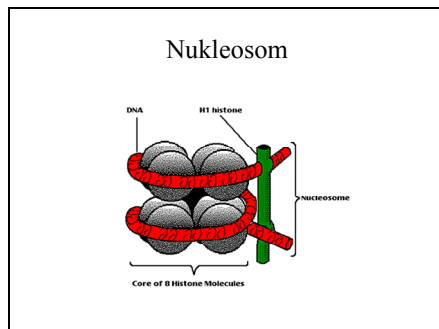
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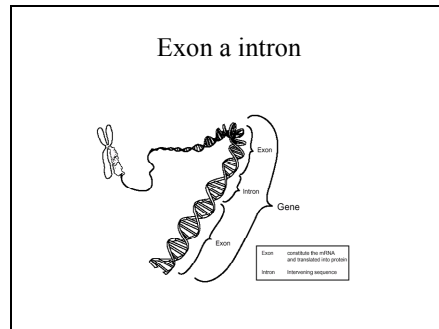
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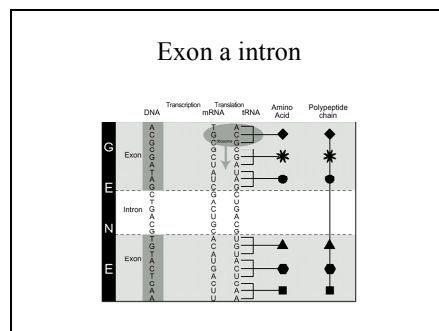
snímek 27



snímek 28



snímek 29



snímek 30

Stanovení sekvence DNA

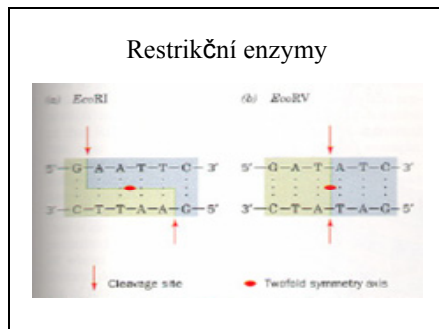
- Restrikční enzymy
- Chemické štěpení – Maxam Gilbertovo metoda
- Enzymová metoda

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Restrikční enzymy

Enzyme	Recognition Sequence*	Microorganism
<i>AbaI</i>	AGGC*TT	<i>Aerobacterium baumannii</i>
<i>BamHI</i>	GGATC*C	<i>Bacillus amyloliquefaciens</i> H
<i>BglII</i>	GCNNNNINGCC	<i>Bacillus globigii</i>
<i>BglI</i>	AGATCT	<i>Bacillus globigii</i>
<i>EcoRI</i>	GAATTC	<i>Escherichia coli</i> RV13
<i>EcoRII</i>	CCN*CTGG	<i>Escherichia coli</i> K245
<i>EcoRV</i>	GA*TTATC	<i>Escherichia coli</i> J62 pLG74
<i>HaeIII</i>	ROGGGAY	<i>Haemophilus azoffii</i>
<i>HaeII</i>	GGCC*C	<i>Haemophilus azoffii</i>
<i>HaeIII</i>	A*TAGCTT	<i>Haemophilus influenzae</i> R ₄
<i>HpaII</i>	CC*GG	<i>Haemophilus parainfluenzae</i>
<i>MspI</i>	C*GGG	<i>Moraxella</i> species
<i>PstI</i>	CTGCA*IG	<i>Providencia stuartii</i> 164
<i>PvuII</i>	CAGC*TO	<i>Protonotus radgani</i>
<i>SatI</i>	GTTGAC	<i>Streptomyces albus</i> G
<i>TaqI</i>	TTCGA*	<i>Thermus aquaticus</i>
<i>XbaI</i>	CITCGAG	<i>Xanthomonas holakii</i>

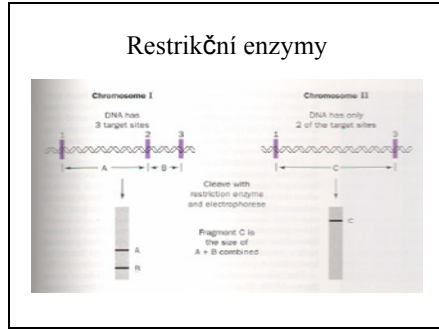
snímek 32



snímek 33



snímek 34



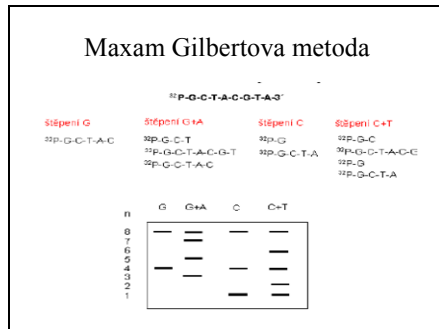
snímek 35

Maxam Gilbertova metoda

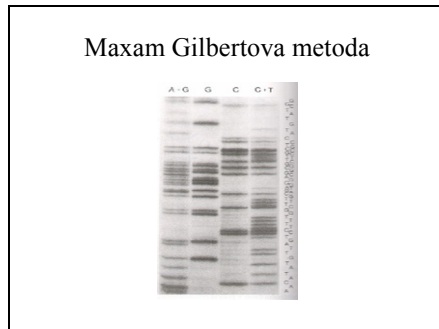
Maxam-Gilbertova metoda

- značení 5' konce ^{32}P
- specifické chemické štěpení
- elektroforéza

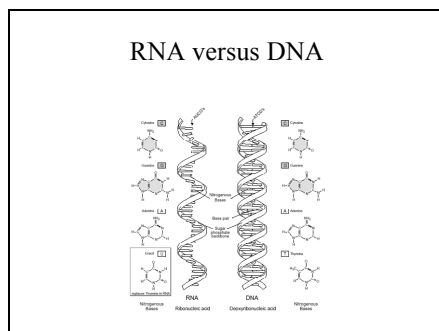
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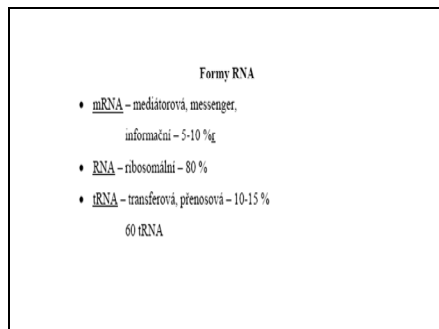
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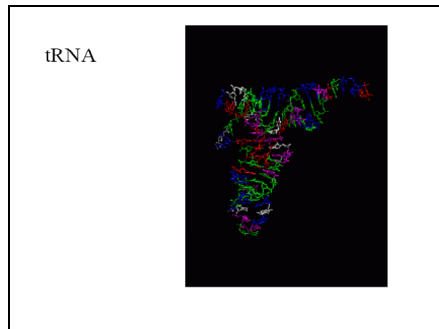
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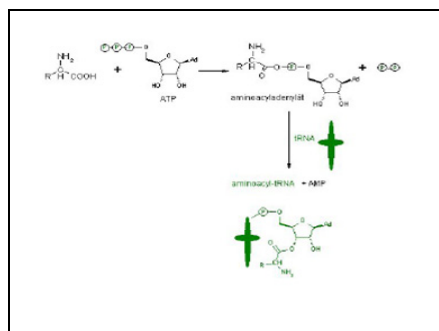
snímek 39



snímek 40



snímek 41

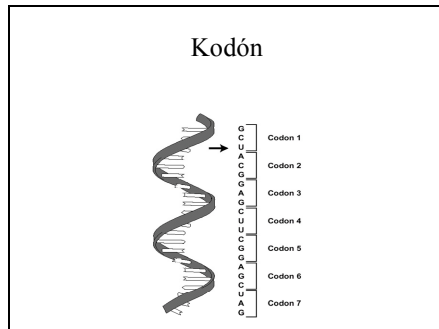


snímek 42

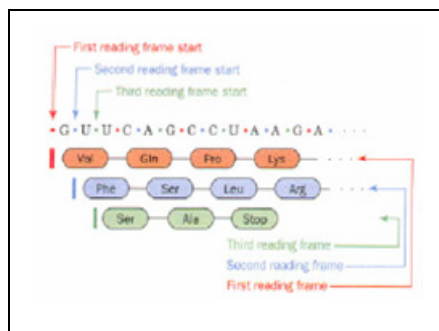
Genetický kod

1st base in codon	2nd base in codon			
	U	C	A	G
U	Phe	Leu	Ile	Met
C	Pro	Leu	Ile	Met
A	Thr	Ala	Val	Met
G	Cys	Ala	Val	Met

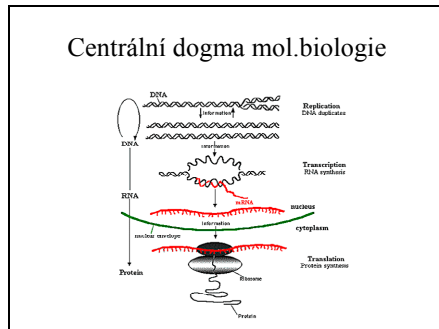
snímek 43



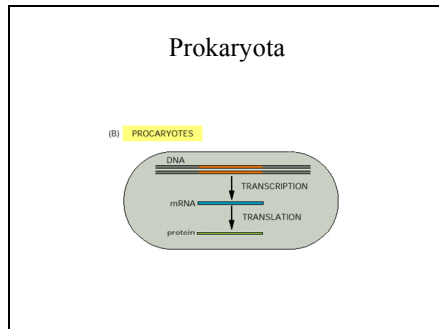
snímek 44



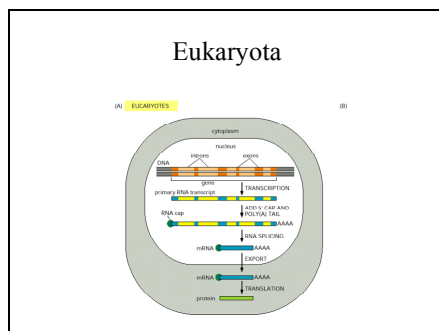
snímek 45



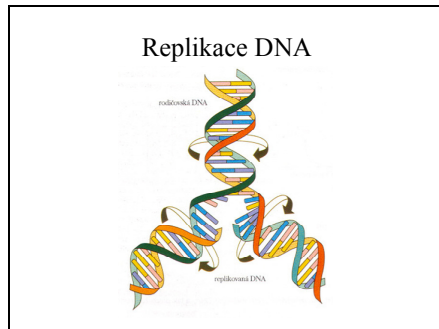
snímek 46



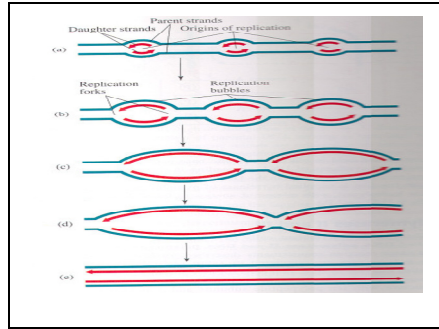
snímek 47



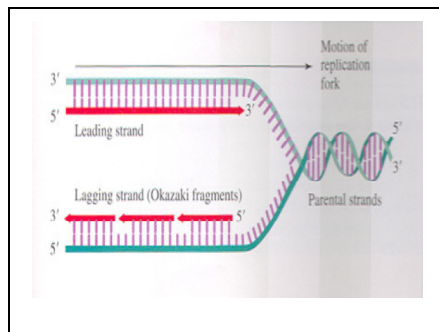
snímek 48



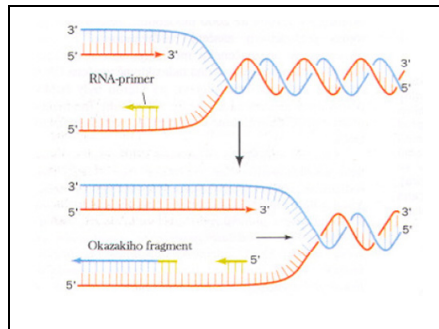
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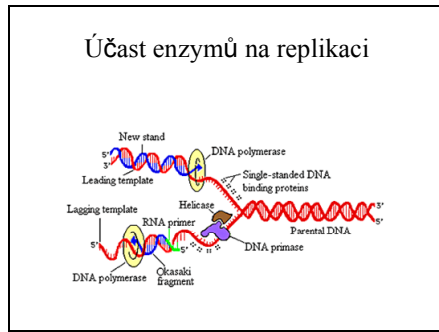
snímek 50



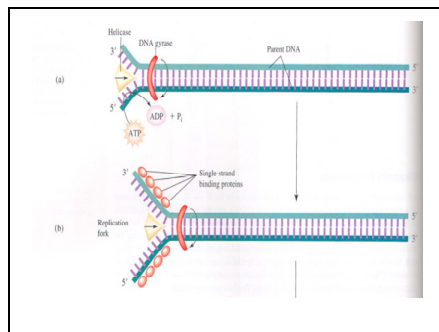
snímek 51



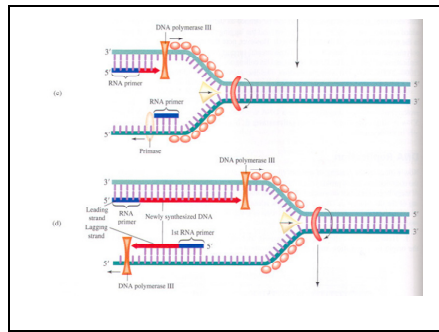
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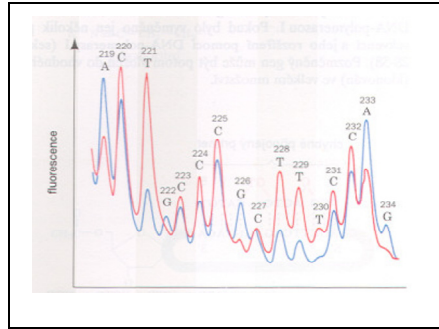
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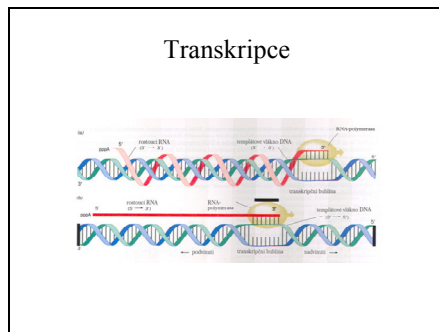
snímek 54



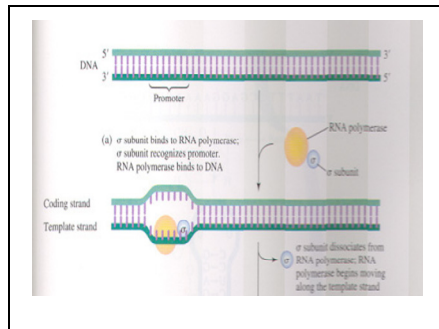
snímek 58



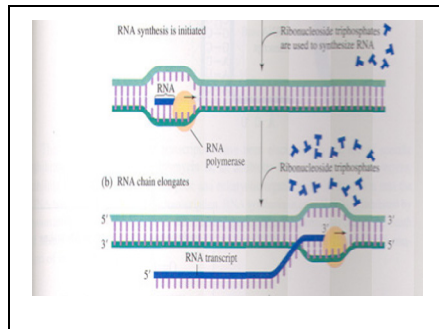
snímek 59



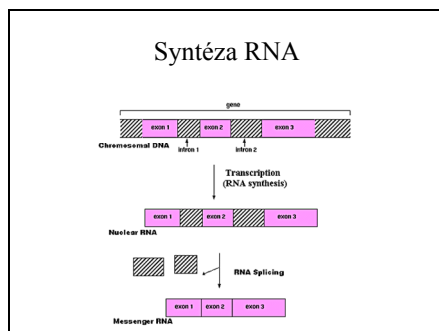
snímek 60



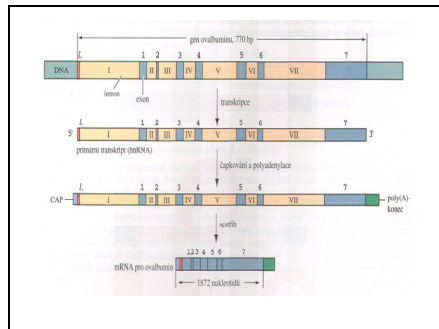
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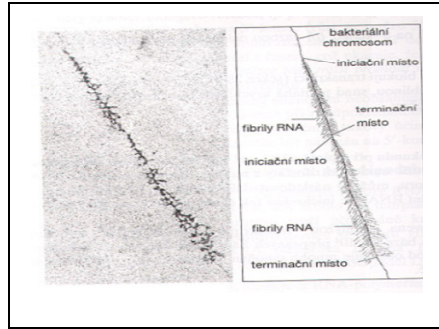
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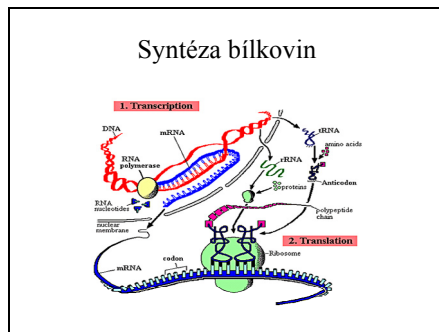
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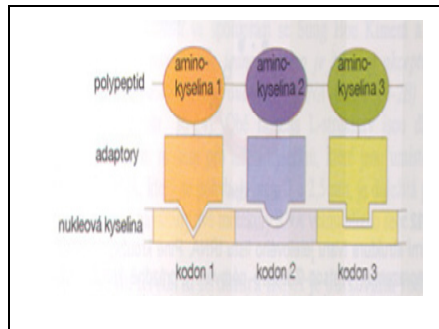
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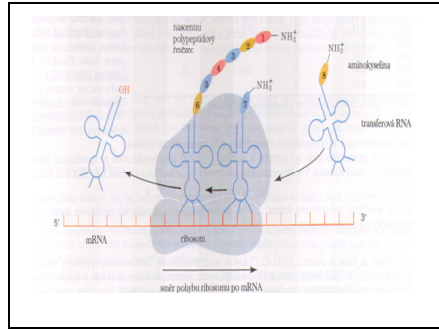
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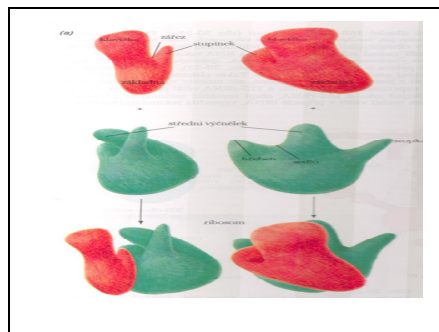
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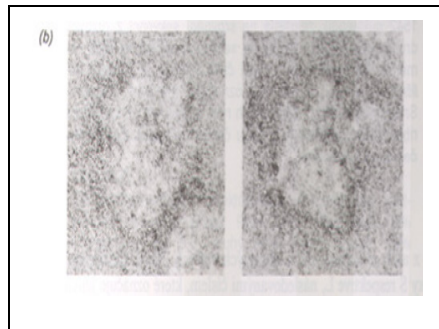
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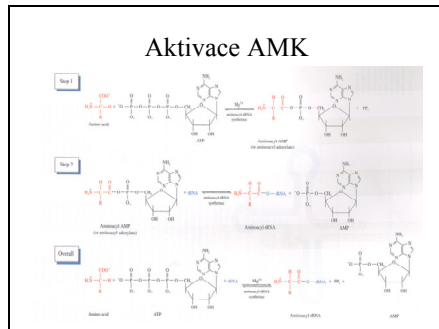
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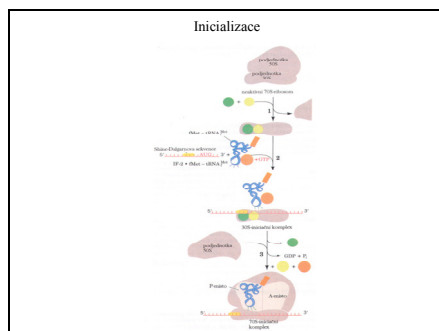
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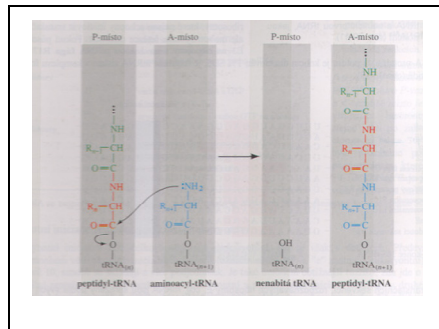
snímek 70



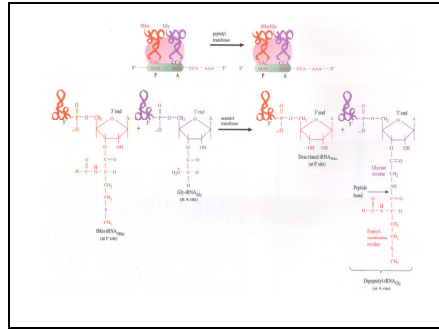
snímek 71



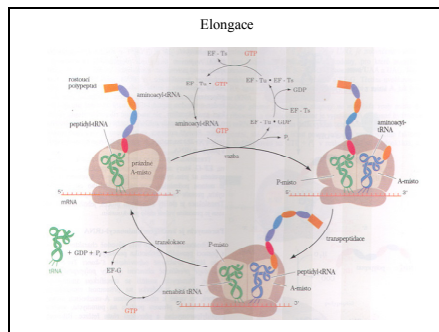
snímek 72



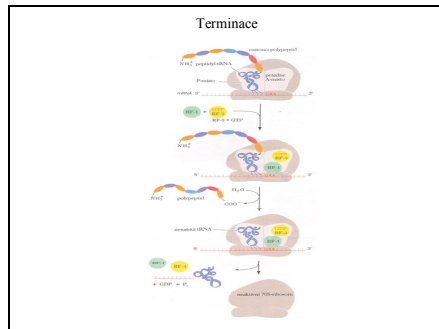
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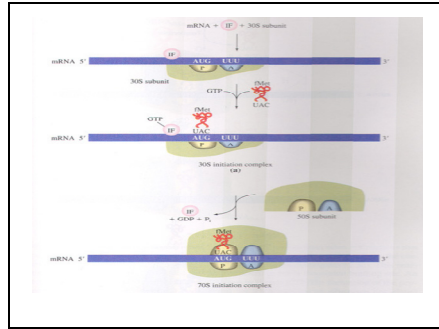
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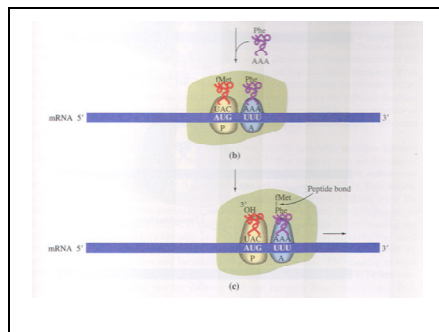
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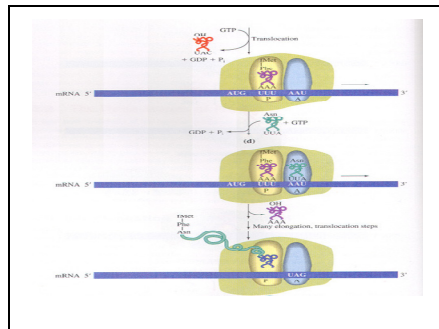
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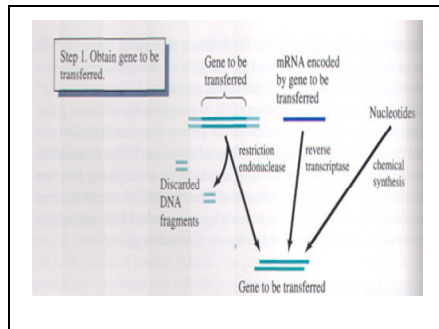
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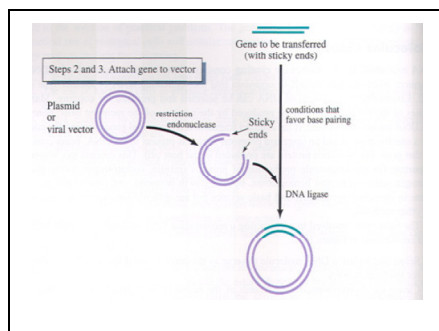
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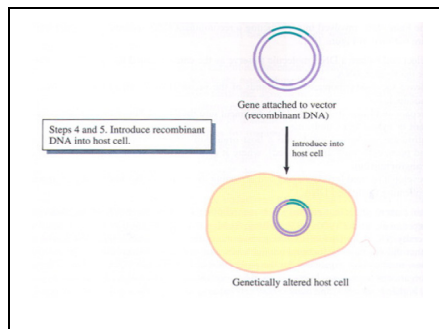
snímek 82



snímek 83



snímek 84



snímek 85

