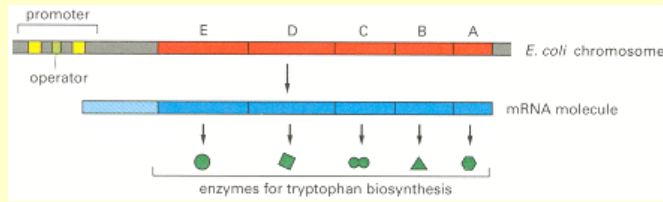
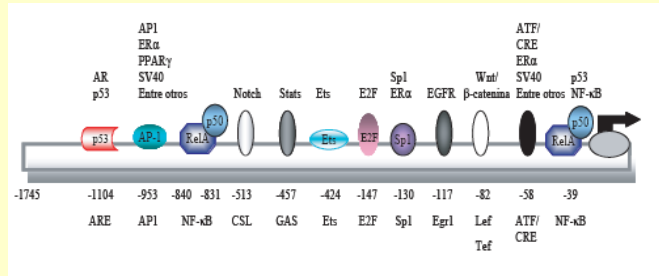


Organización génica

Procariotas

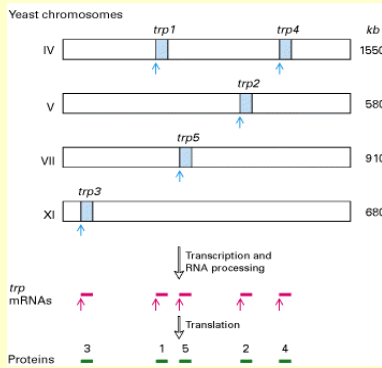


Eucariotas

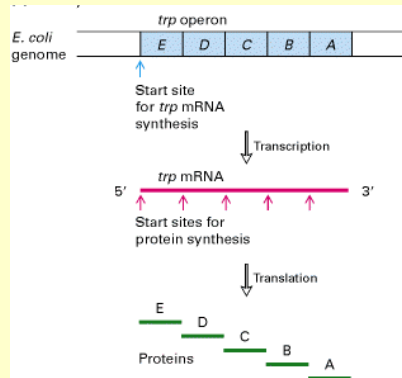


Organización génica

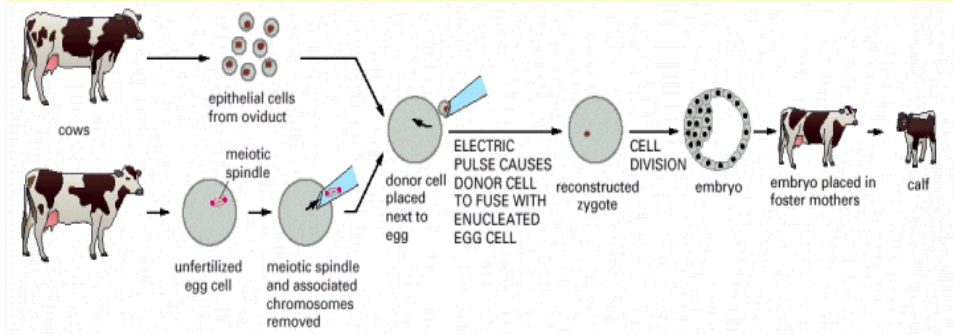
Eucariotas



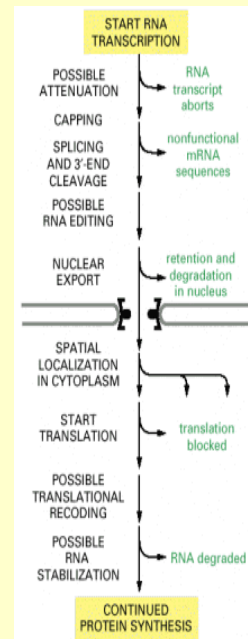
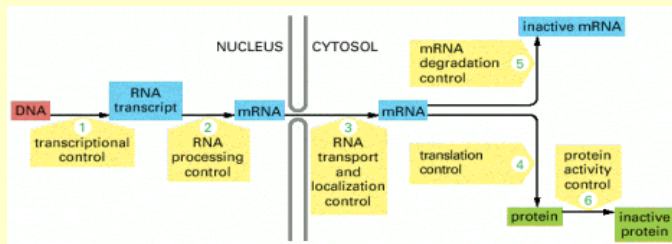
Procariotas



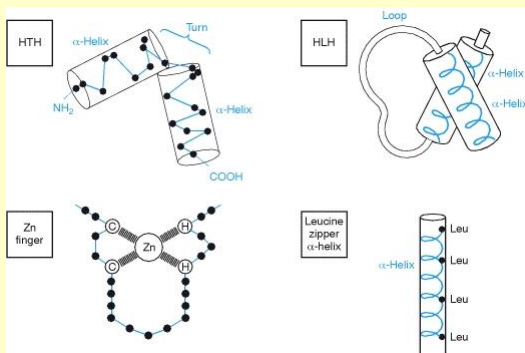
Diferenciación celular y totipotencialidad



Introducción al control génico



Introducción: Proteínas de regulación génica y sus secuencias

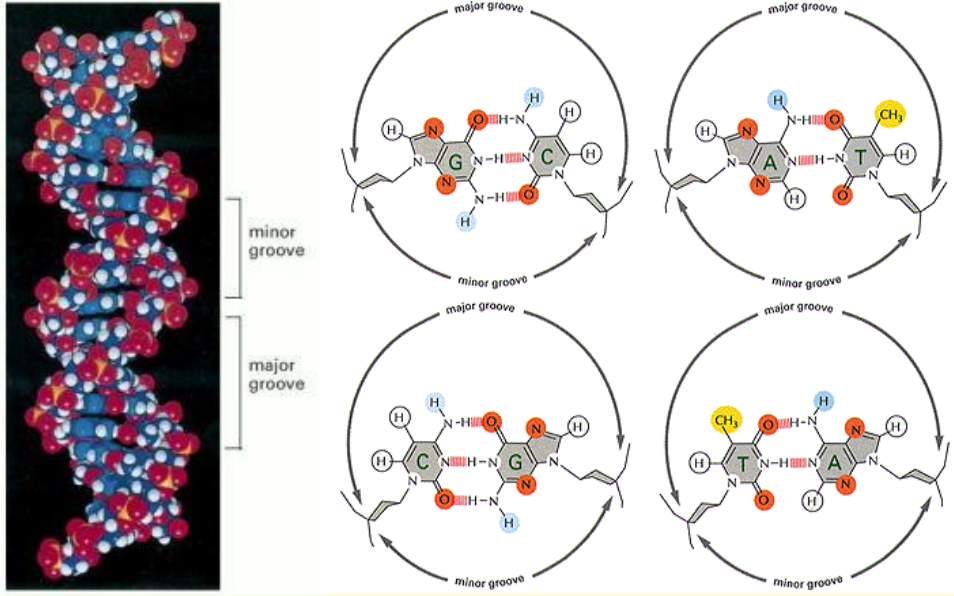


- ❖ Motivo Hélice-giro-hélice
- ❖ Motivo Zinc-Finger
- ❖ Motivo de Hojas β
- ❖ Motivo de Cierre de Leucinas
- ❖ Motivo Hélice-loop-hélice

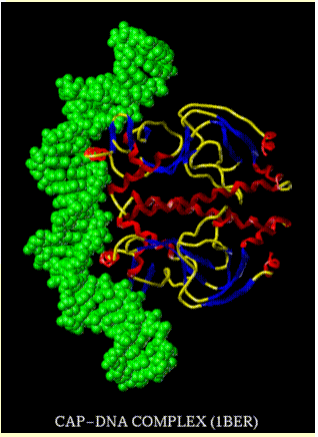
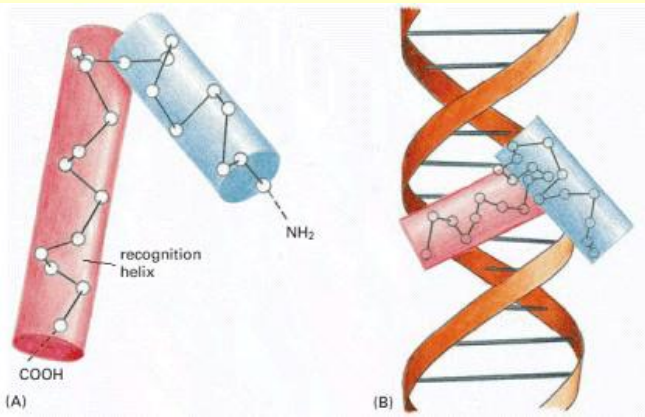
Introducción: Secuencias regulatorias

Factor	Secuencia	Comentario
MYC and MAX	CACGTG	MYC first identified as retroviral oncogene; MAX specifically associates with MYC in cells
FOS and JUN	TGA ^{C/G} T ^{C/A} A	both first identified as retroviral oncogenes; associate in cells, also known as the factor AP-1
CREB	TGACG ^{C/T} C ^{T/A} G ^{G/A}	binds to the cAMP response element (CRE); family of at least 10 factors resulting from different genes or alternative splicing; can form dimers with JUN
ERBA; also TR (thyroid hormone receptor)	GTGTCAAAGGTC A	first identified as retroviral oncogene; member of the steroid/thyroid hormone receptor superfamily; binds thyroid hormone
ETS	G ^{G/A} GGA ^{A/T} G ^{T/C}	first identified as retroviral oncogene; predominates in B- and T-cells
GATA	T ^{T/A} GATA	family of erythroid cell-specific factors, GATA-1 to -6
MYB	T ^{T/C} AAC ^{G/T} G	first identified as retroviral oncogene; hematopoietic cell-specific factor
MYOD	CAACTGAC	master control of muscle cell differentiation
NFkB and REL	GGGA ^{A/C} TN ^{T/C} CC ^{C/T}	both factors identified independently; REL first identified as retroviral oncogene; predominate in B- and T-cells
RAR (retinoic acid receptor)	ACGTGACGACCT	binds to elements termed RAREs (retinoic acid response elements) also binds to JUN/FOS site
SRF (serum response factor)	GGATGTCATATT AGGACATCT	exists in many genes that are inducible by the growth factors present in serum

Introducción: Proteínas de regulación génica

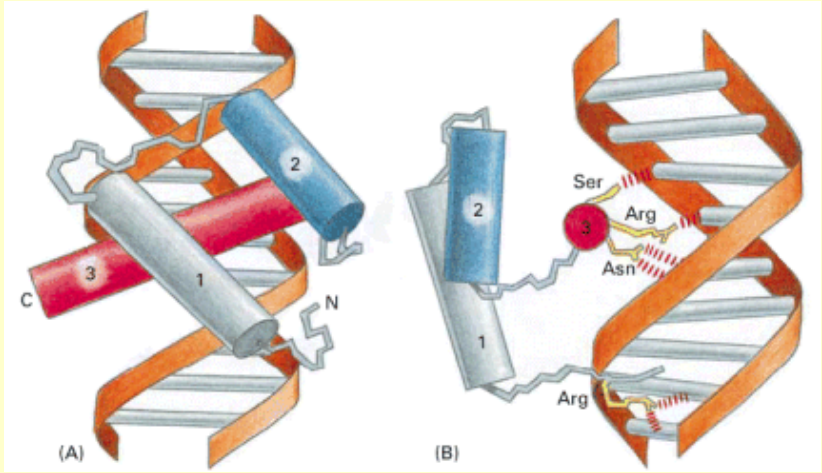


Proteínas de regulación génica: Hélice-giro-hélice



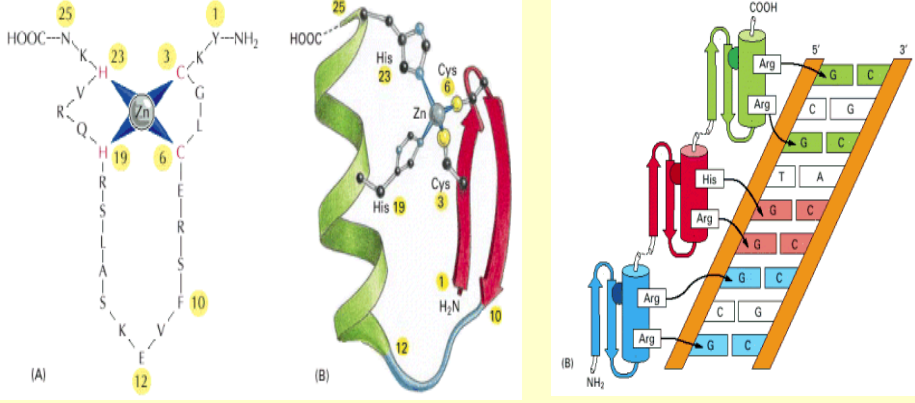
Video

Homeodominios

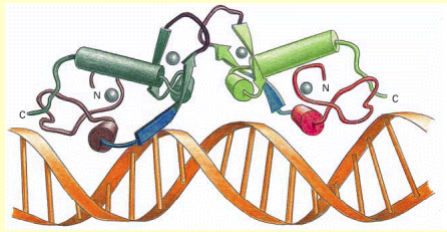


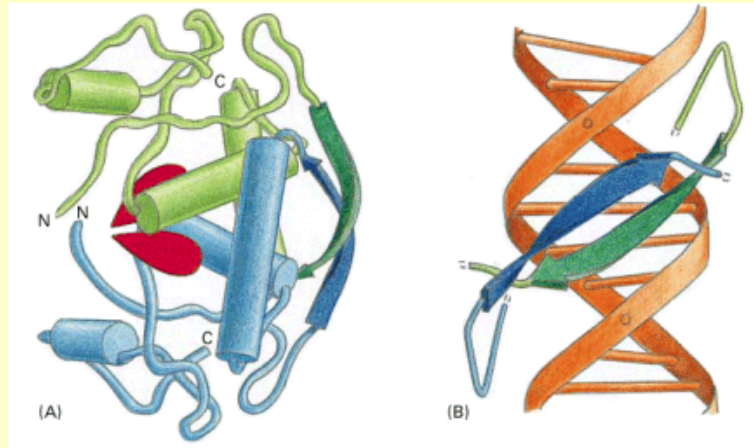
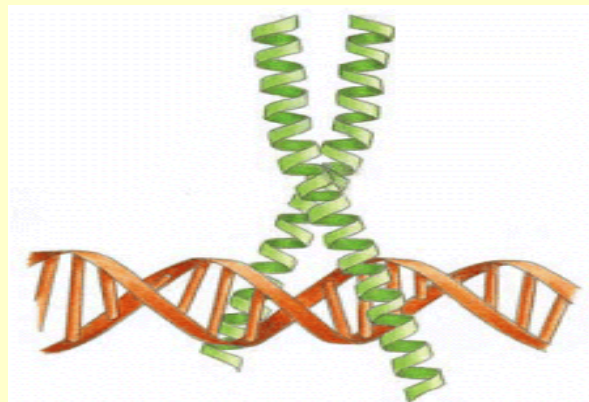
Video

Proteínas de regulación génica: Zinc Finger



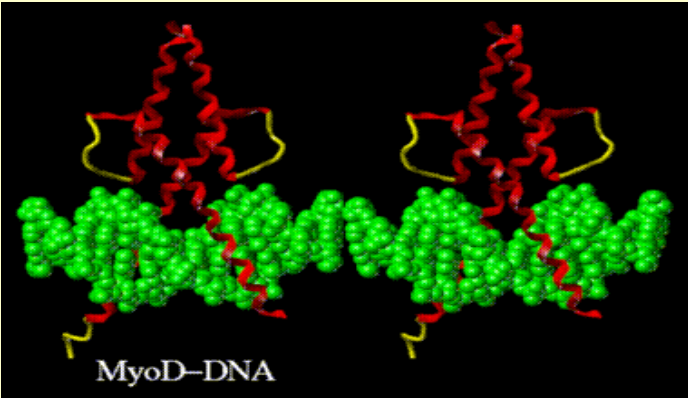
Video



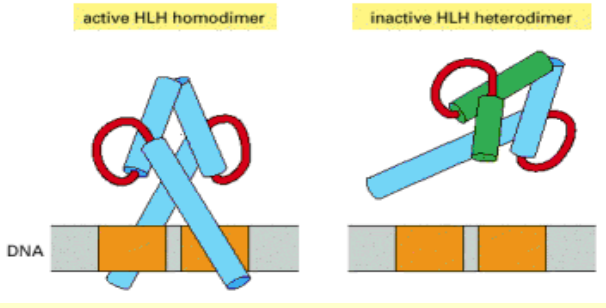
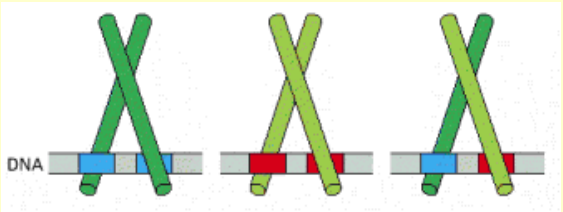
Proteínas de regulación génica: Láminas beta**Proteínas de regulación génica: Cremallera de leucina**

Video

Proteínas de regulación génica: Hélice-bucle-hélice



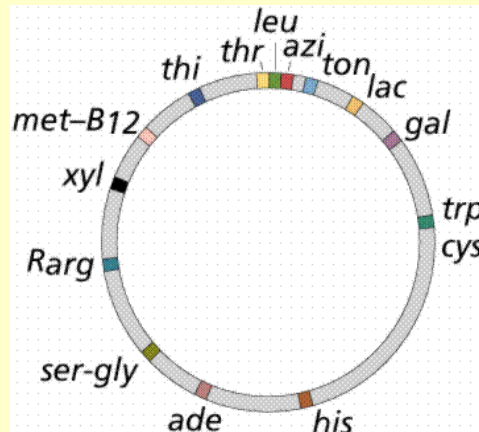
Proteínas de regulación génica: Control combinatorio “Homo- y Heterodimerización”



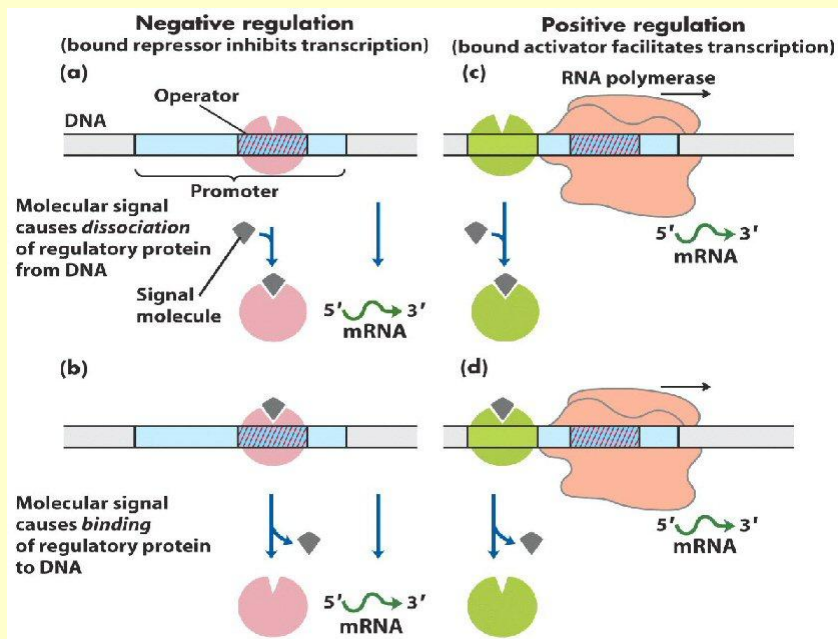
Regulación de la transcripción en procariontas

Escherichia Coli

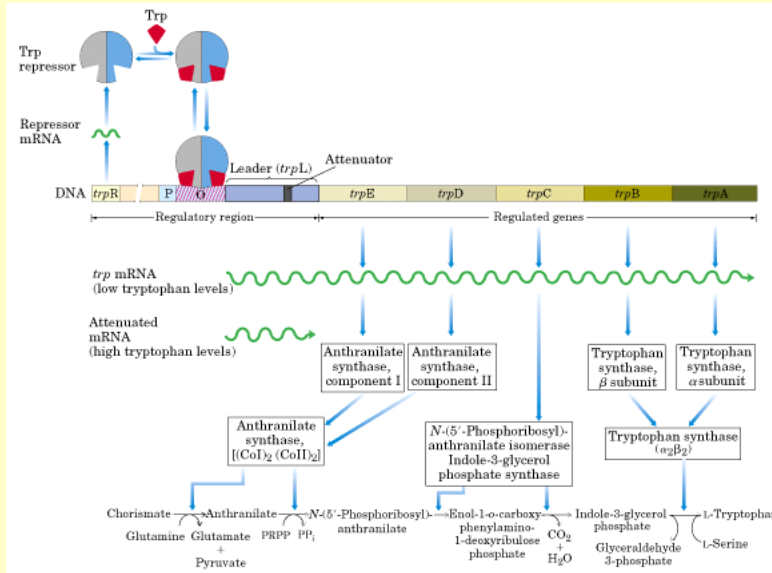
- ADN circular de $4,6 \times 10^6$ pb
- 4300 proteínas



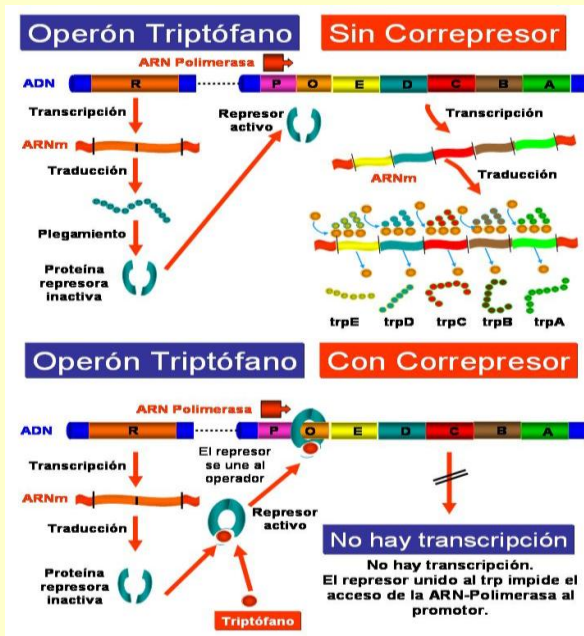
Regulación positiva y negativa



Operón triptofano: Control negativo



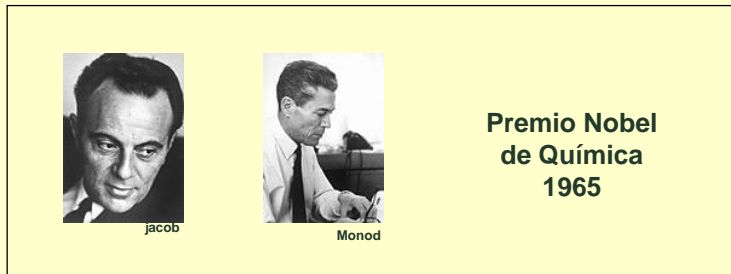
Operón triptofano: Control negativo



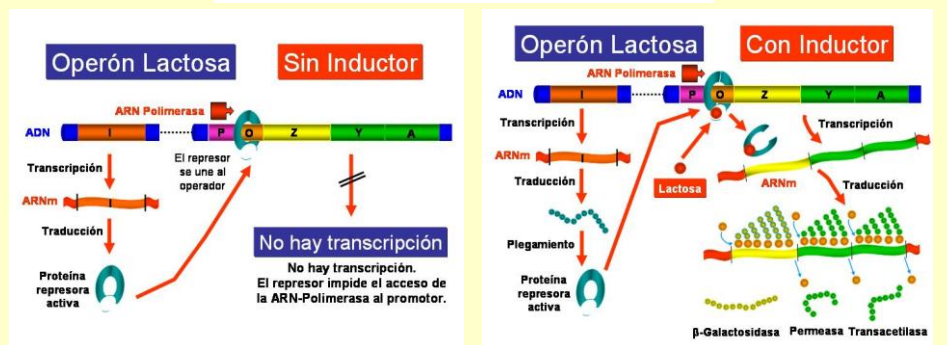
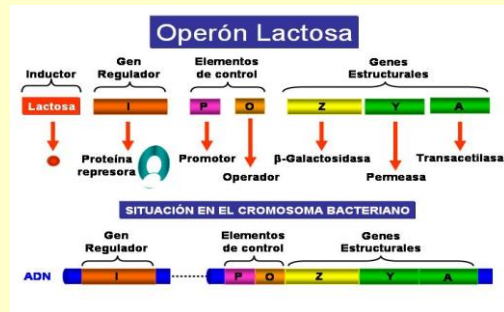
Operón Lactosa: Control positivo.....

Este trabajo es considerado uno de los pioneros en el estudio del control de la expresión génica desde el enfoque de la Biología Molecular.

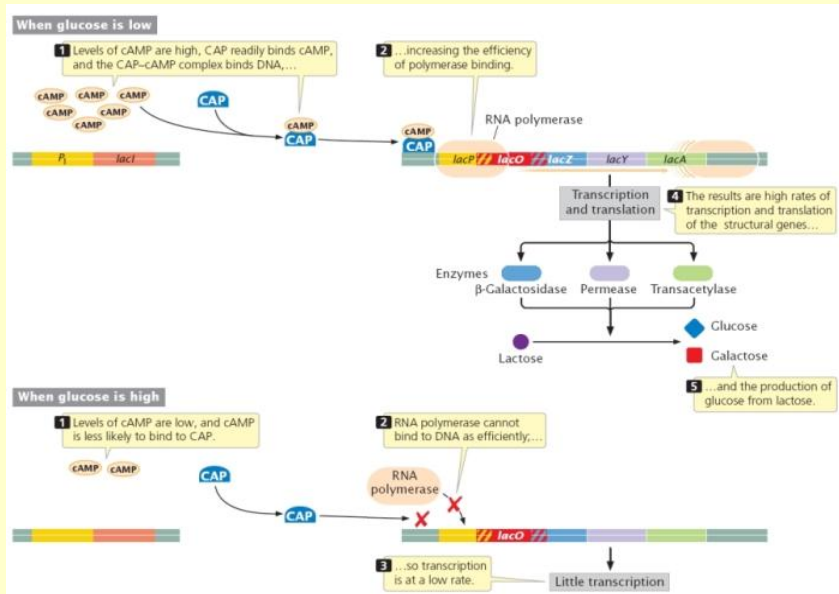
Fue considerado por las revistas científicas del momento como un trabajo que no cumplía los requisitos de publicación, por lo que los autores fundaron su propia revista (the Journal of Molecular Biology) y el artículo del Operón Lactosa ocupaba 80 páginas del primer número.



Operón Lactosa: Control negativo.....



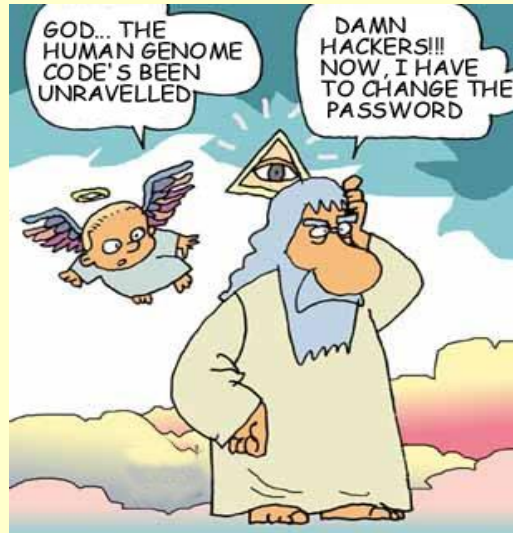
Operón Lactosa: ... y positivo



Factores sigma

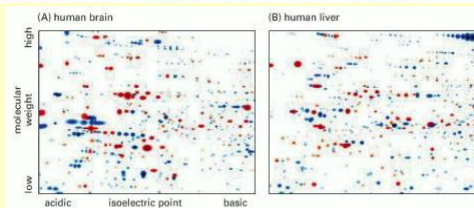
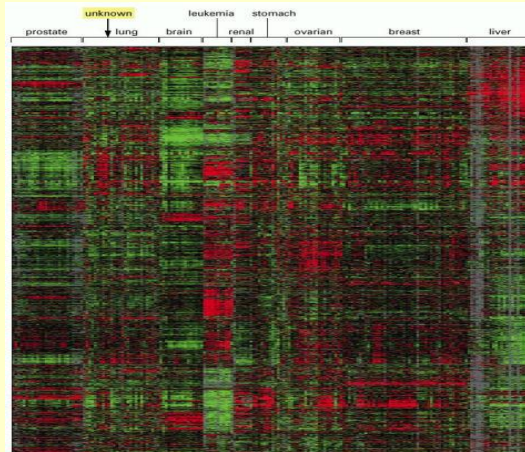
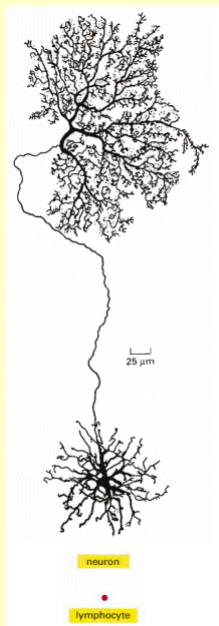
Gen	Factor	Uso
<i>rpoD</i>	σ^{70}	General
<i>rpoS</i>	σ^S	Estrés
<i>rpoH</i>	σ^{32}	Choque térmico
<i>rpoE</i>	σ^E	Choque térmico
<i>rpoN</i>	σ^{54}	Nitrógeno
<i>flaA</i>	σ^{28} (σ^F)	Flagelos

Recreo



3 Gb ADN eucariota

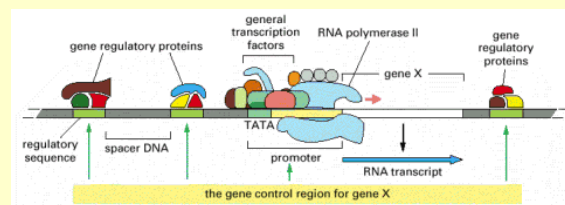
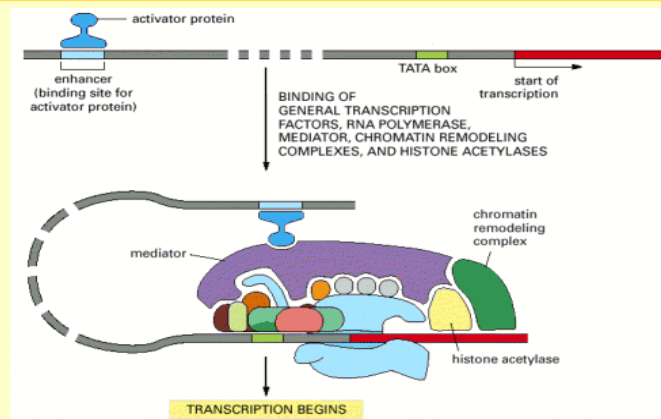
Regulación de la transcripción en eucariotas



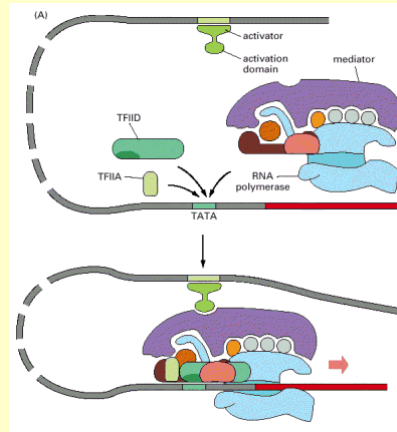
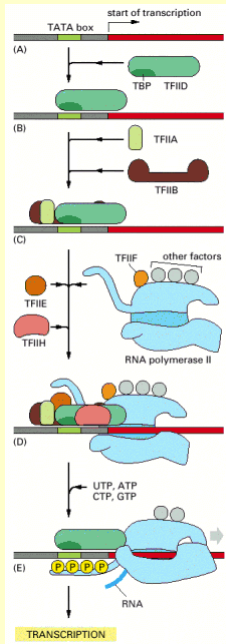
Regulación de la transcripción en eucariotas

- ❖ Las proteínas que regulan la transcripción pueden controlar la actividad de un determinado promotor por unión a secuencias que se encuentran muy distantes.
- ❖ La actividad de la ARN polimerasa II es regulada por la velocidad de ensamblado del complejo de factores generales de la transcripción.
- ❖ El empaquetamiento del ADN genera una oportunidad para la regulación de la transcripción

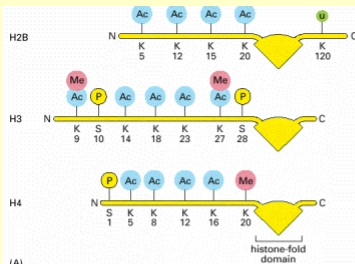
Introducción al control génico: Secuencias regulatorias



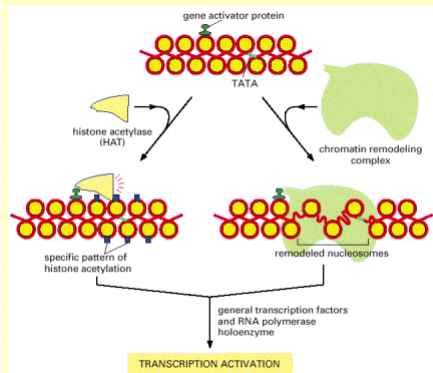
Regulación de la transcripción en eucariotas: La ARN polimerasa II



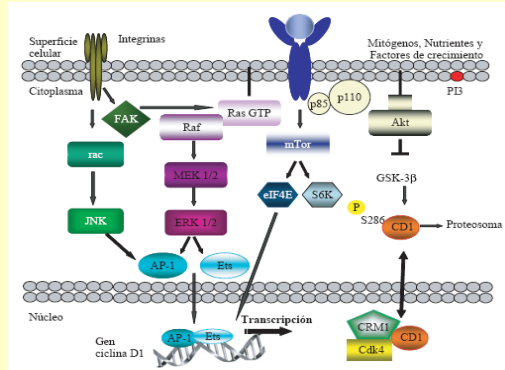
Regulación de la transcripción en eucariotas: Estructura de la cromatina



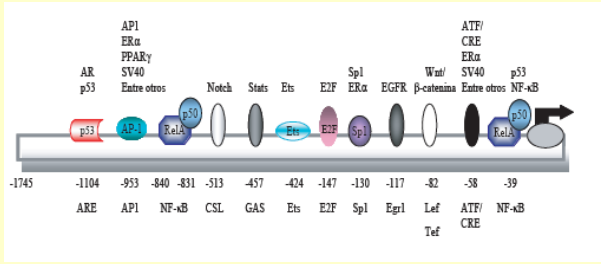
	modification state	"meaning"
HISTONE H2B	unmodified	gene silencing?
HISTONE H2B	acetylated	gene expression
HISTONE H3	acetylated	histone deposition
HISTONE H3	methylated	gene silencing/heterochromatin
HISTONE H3	phosphorylated	mitosis/meiosis
HISTONE H3	phosphorylated/acetylated	gene expression
HISTONE H3	higher-order combinations	?
HISTONE H4	unmodified	gene silencing?
HISTONE H4	acetylated	histone deposition
HISTONE H4	acetylated	gene expression



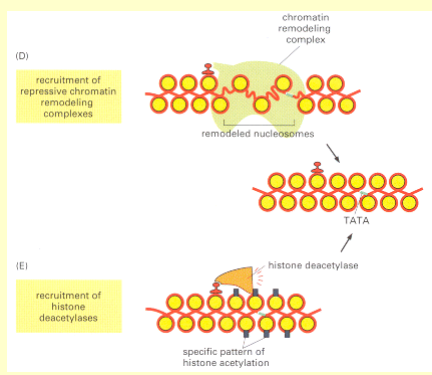
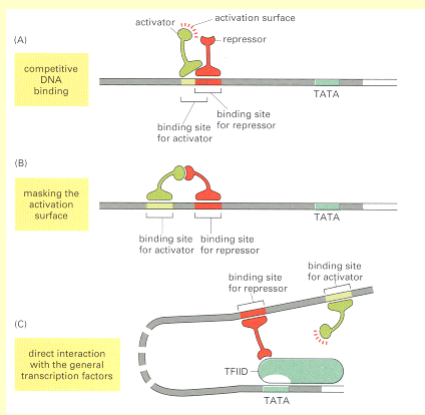
Proteínas que regulan la transcripción: Activadores de la transcripción



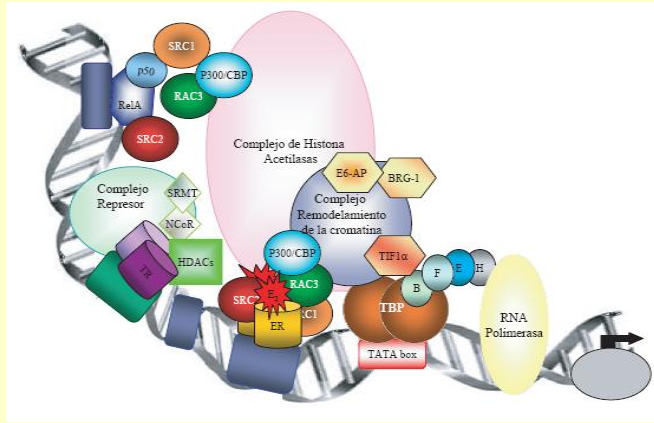
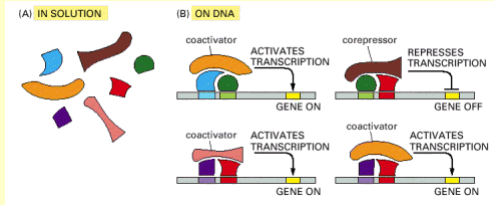
- GENE ACTIVATOR PROTEIN BINDS TO CHROMATIN**
 - chromatin remodeling complex
- CHROMATIN REMODELING**
 - histone modification enzymes
- COVALENT HISTONE MODIFICATION**
 - other activator proteins
- ADDITIONAL ACTIVATOR PROTEINS BOUND TO GENE REGULATORY REGION**
 - general transcription factors
 - RNA polymerase
- ASSEMBLY OF PRE-INITIATION COMPLEX AT THE PROMOTER**
 - other activator proteins
 - rearrangement of proteins in the pre-initiation complex
- TRANSCRIPTION INITIATION**



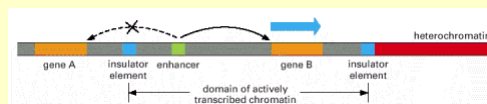
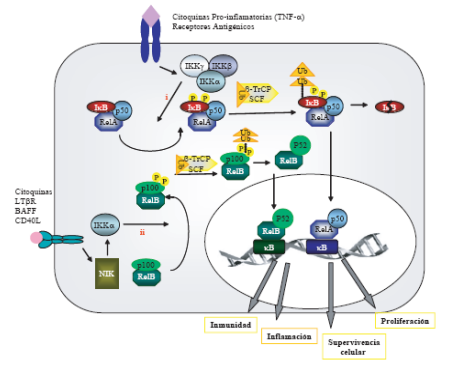
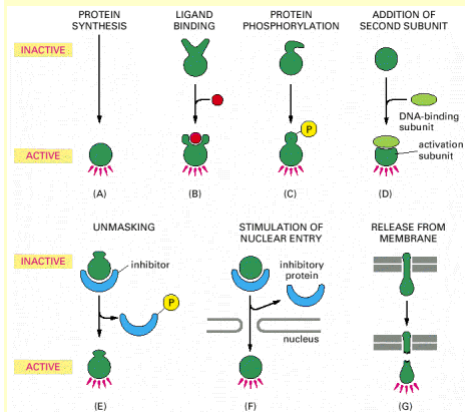
Proteínas que regulan la transcripción: Represores de la transcripción



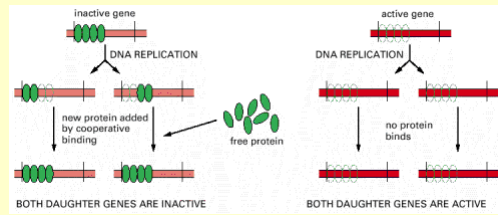
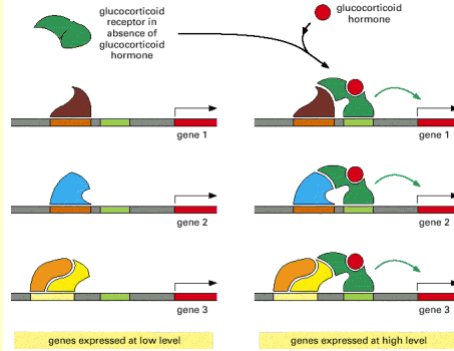
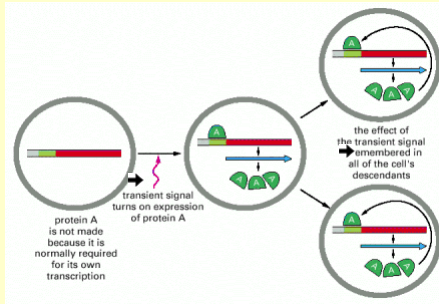
Proteínas que regulan la transcripción: Complejos de regulación



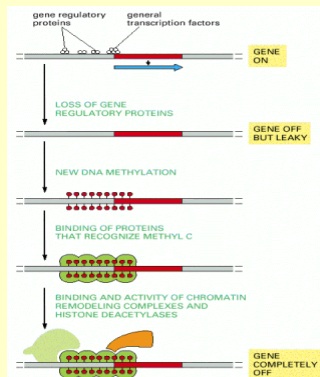
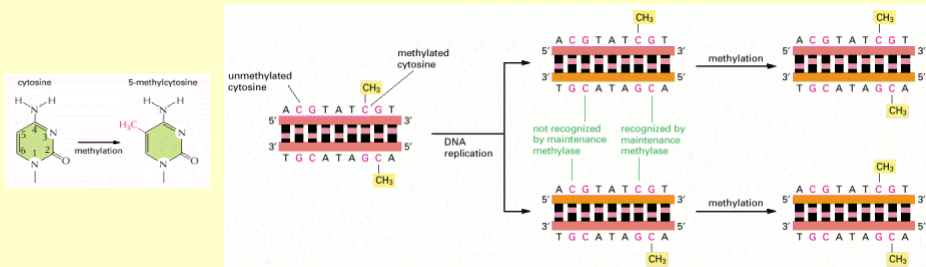
Proteínas que regulan la transcripción: Su regulación



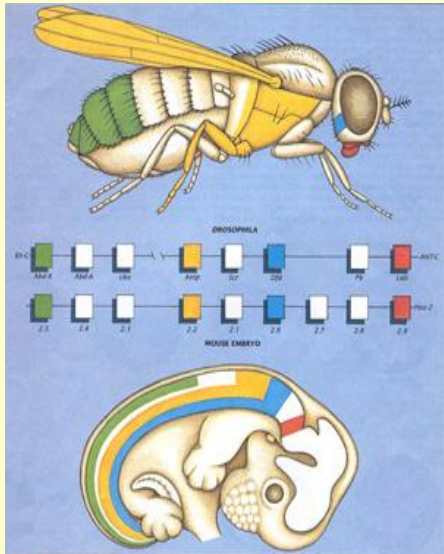
Diferenciación celular y mecanismos de memoria celular



Mecanismos de memoria celular: Metilación del ADN



Desarrollo en *Drosophila*



Desarrollo en *Drosophila*

