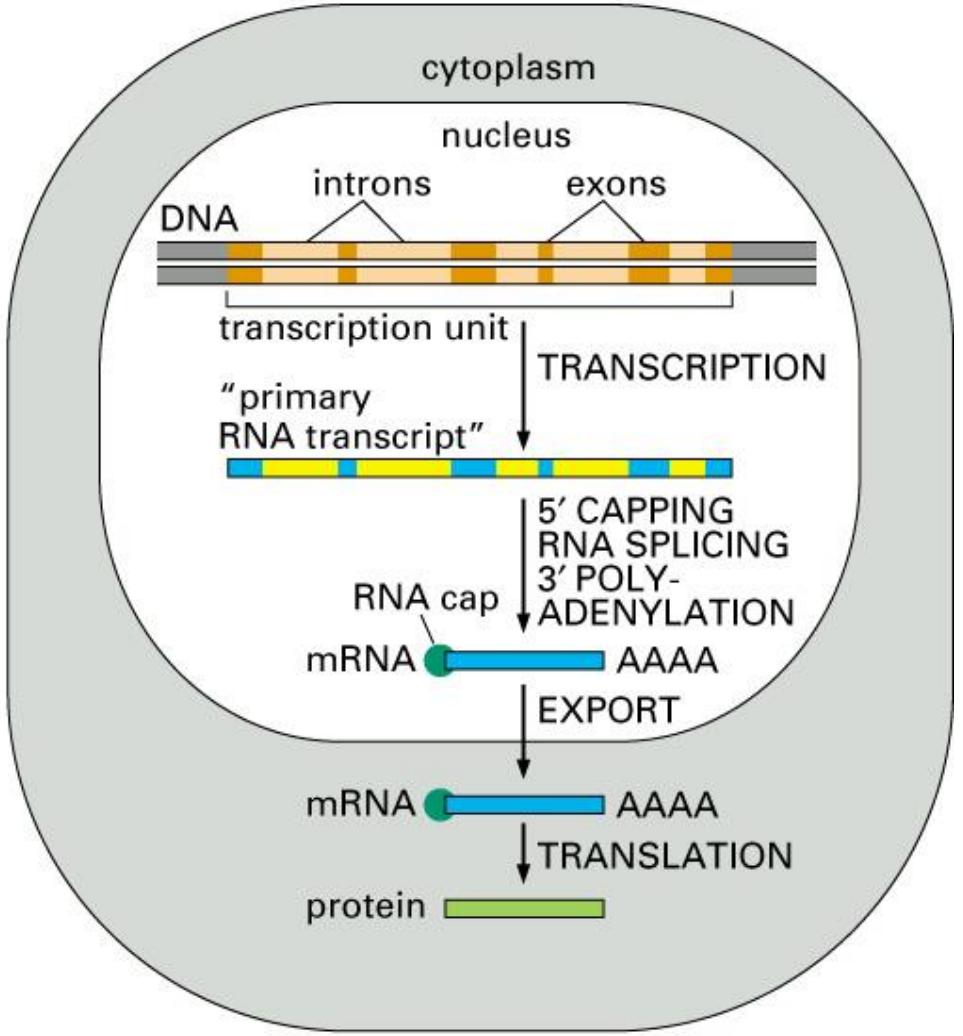
Processamento de RNA

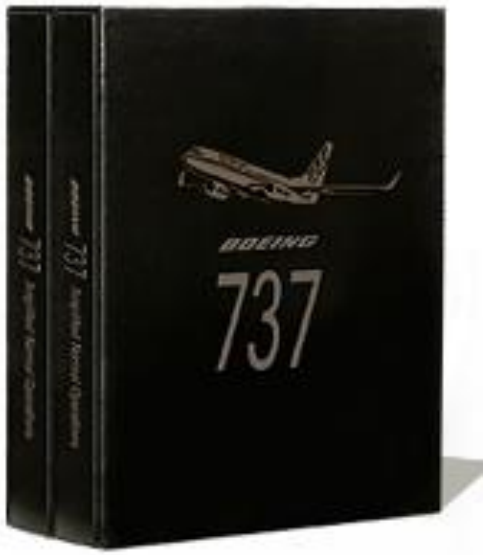


Biologia Molecular da Célula
Alberts, Johnson, Lewis, Morgan, Raff, Roberts, Walter – 6ª edição
Capítulo 6

Nícolas Hoch

O “dogma” central da Biologia Molecular

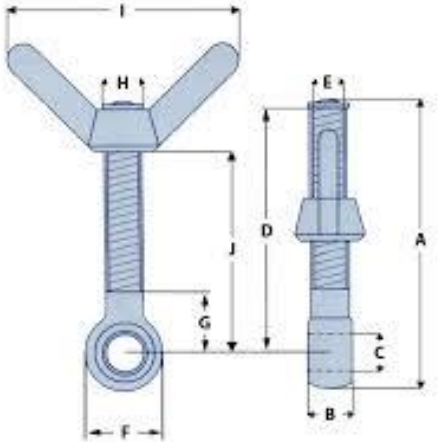
DNA



Replicação

Transcrição

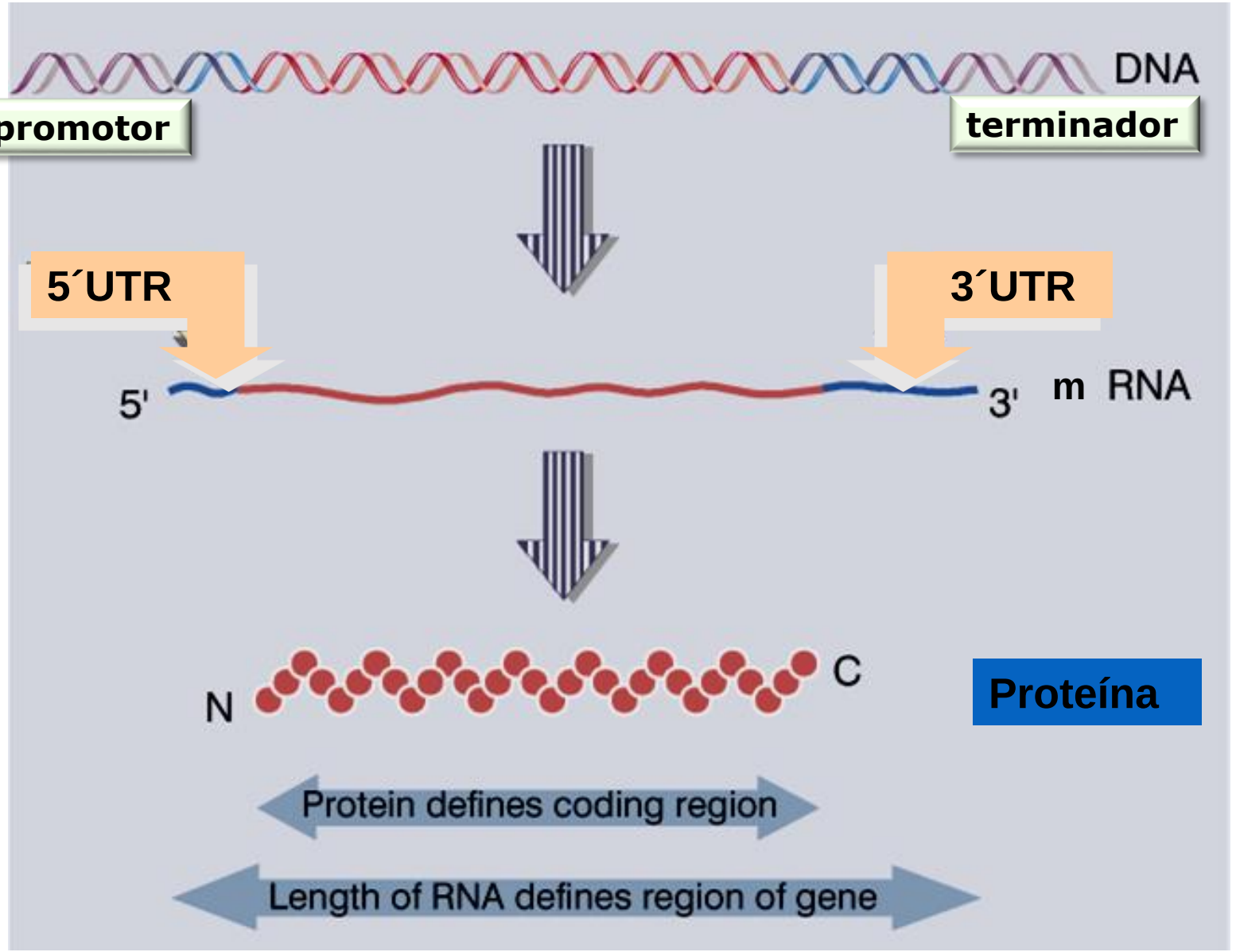
RNA

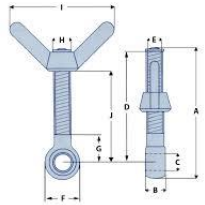


Tradução

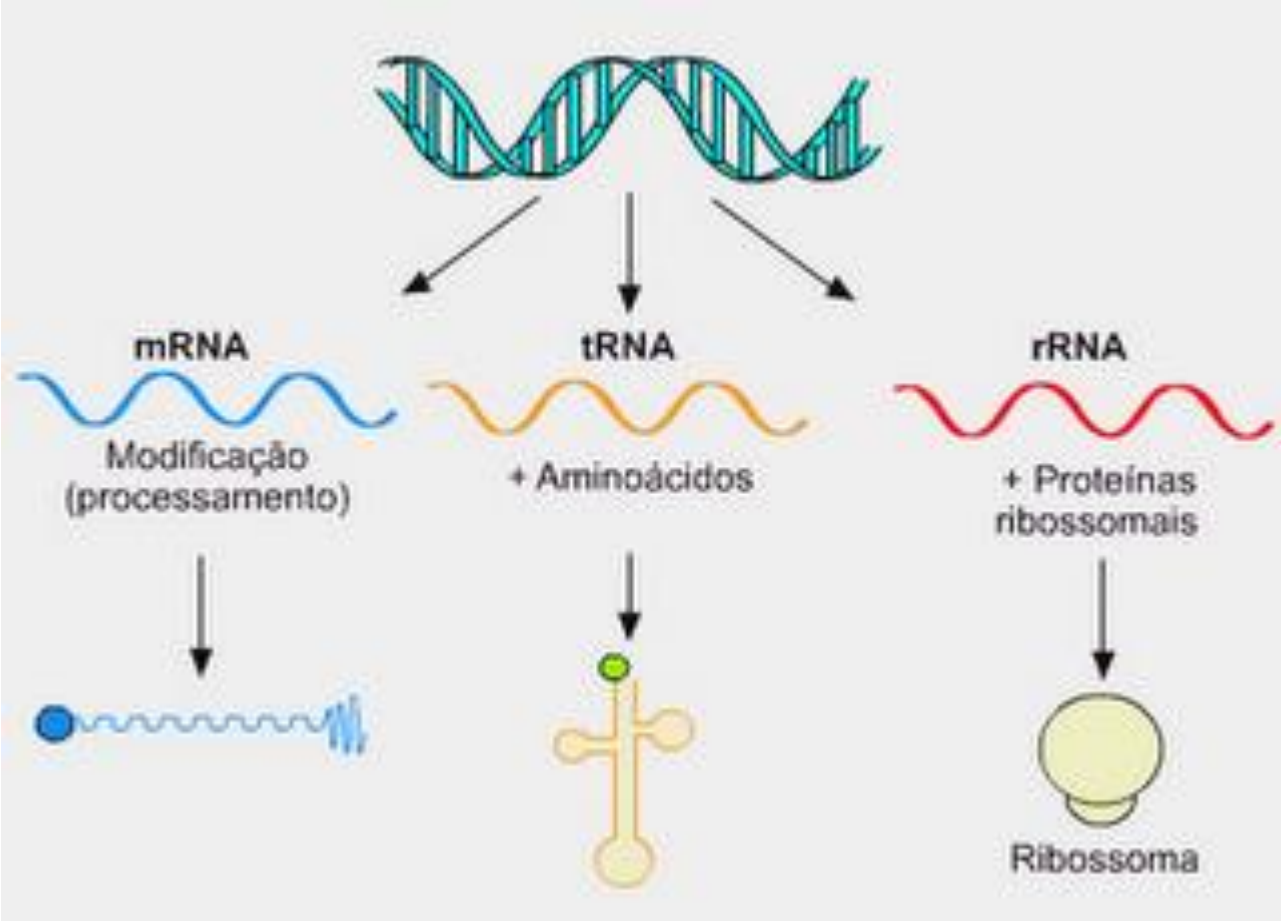
proteína

Um gene (simplificado)





Nem todo RNA codifica proteínas



RNA Polimerase I transcreve rRNA

RNA Polimerase II transcreve mRNA

RNA Polimerase III transcreve tRNA

RNAs não-codificadores (siRNA, miRNA, lncRNA, snRNA, snoRNA, piRNA….)

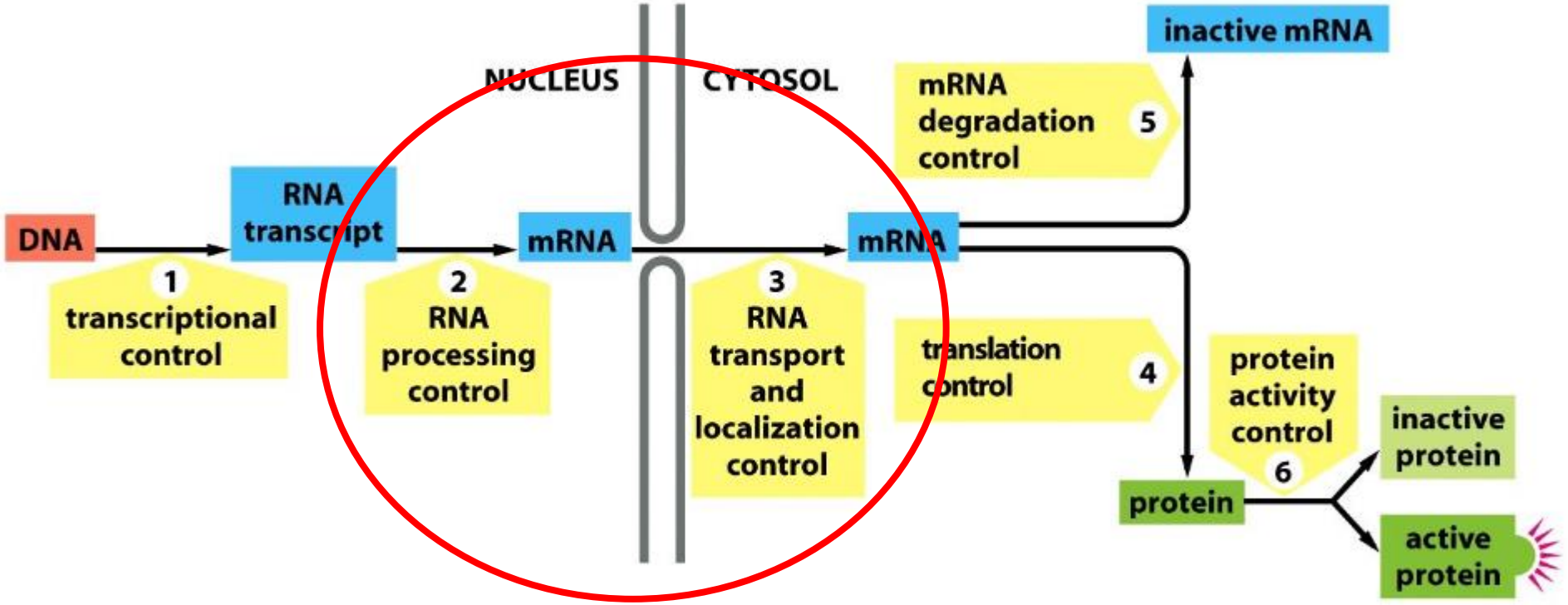
A maioria do genoma NÃO codifica proteínas

organismo	Número de genes (aprox)
Mycoplasma genitalium	500
Escherichia coli	4.000
Levedura	6.000
C. elegans (verme)	13.000
Mosca	20.000
Camundongo	20.000
Humanos	20.000
Tomate	36.000
Arroz	46.000

→ 1,5% do genoma codifica proteína

Resto: íntrons (RNA não-traduzido)
regulação genes
estrutural (centrômero/telômero)
50% DNA repetitivo (lixo???)

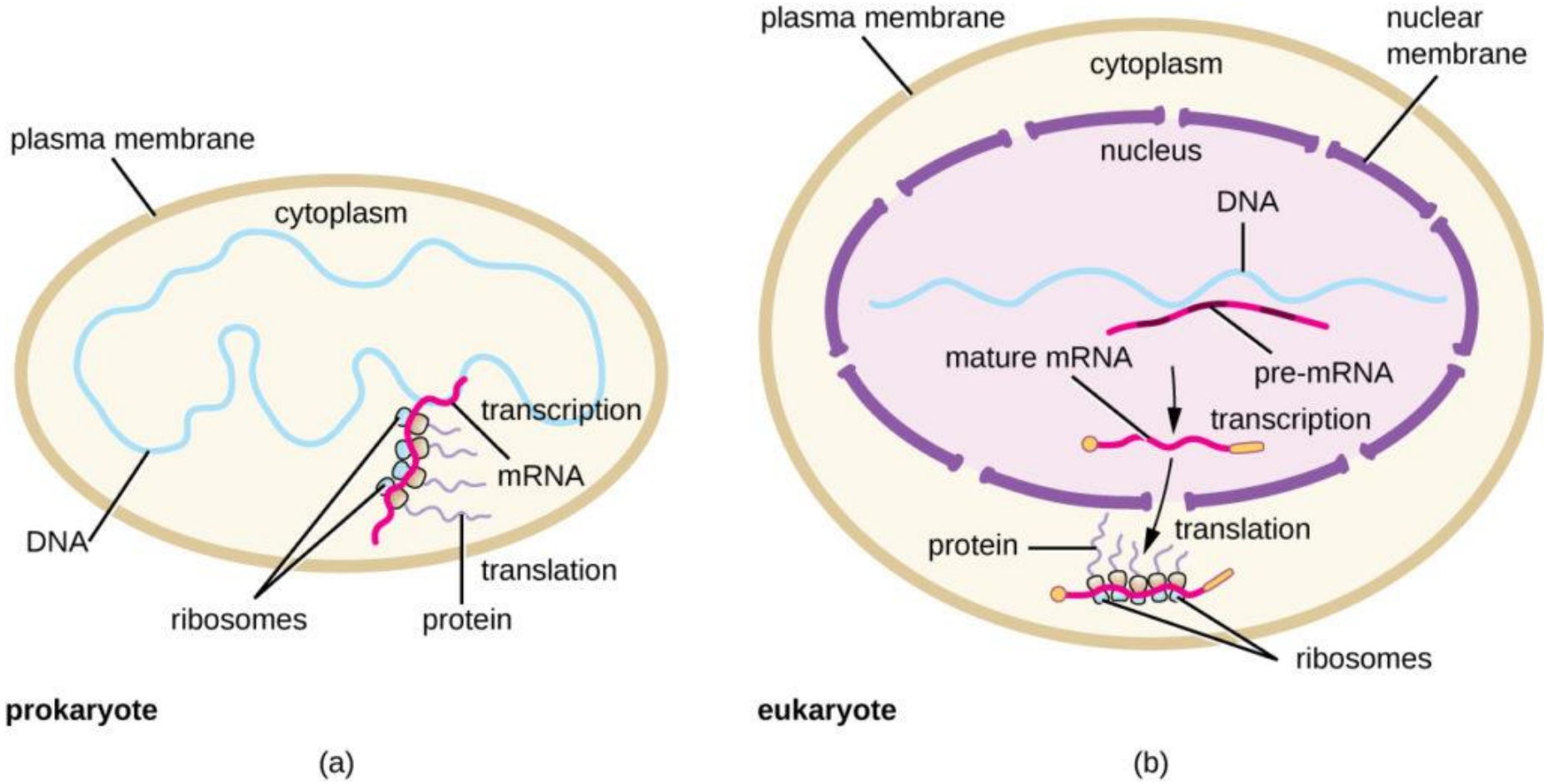
Regulação da Expressão Gênica



Custo energético

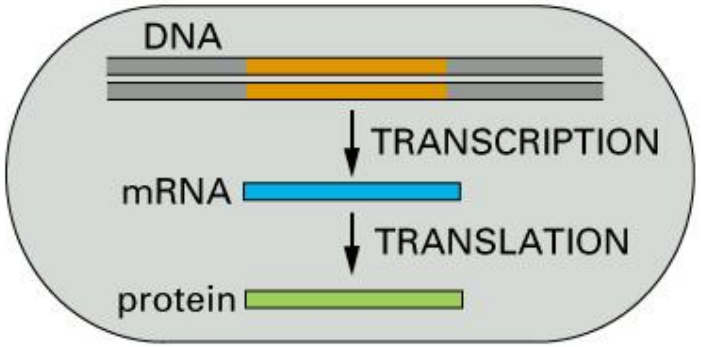
Tempo até resposta biológica

Procariotos vs eucariotos

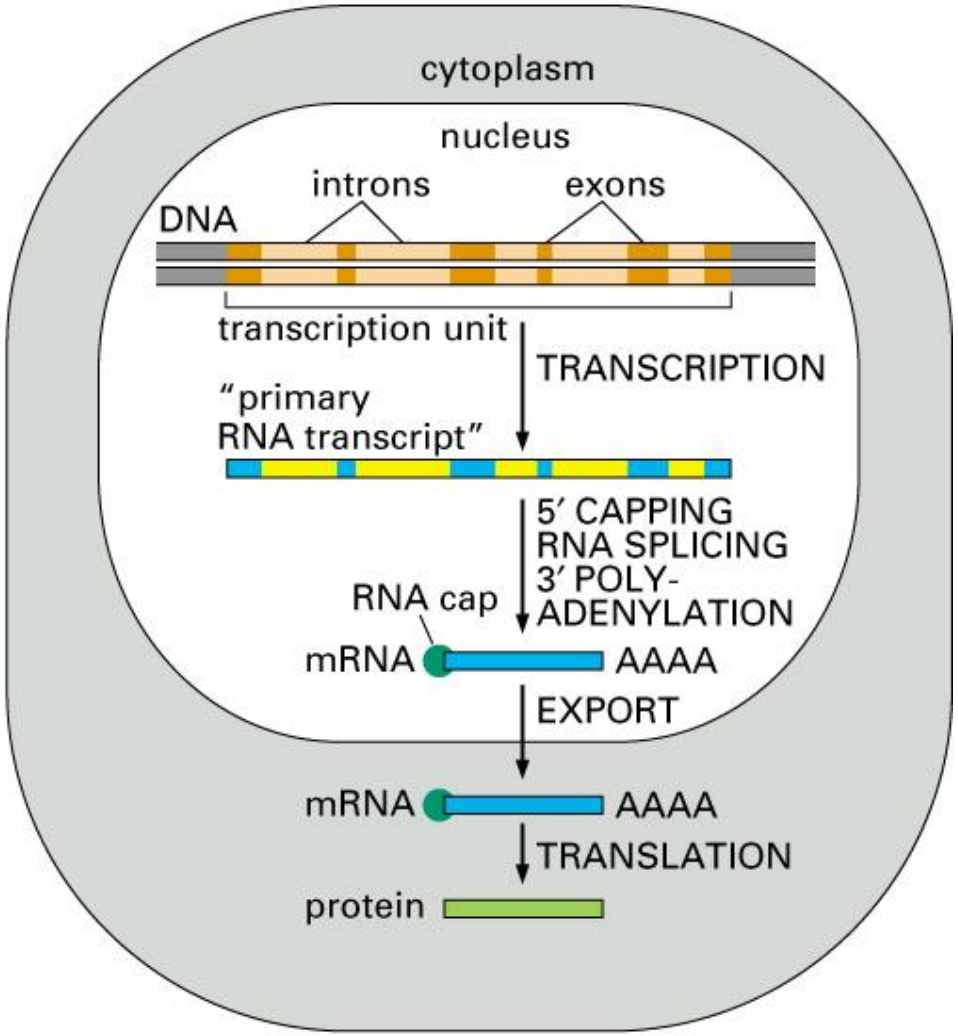


Em eucariotos, o RNA mensageiro é processado

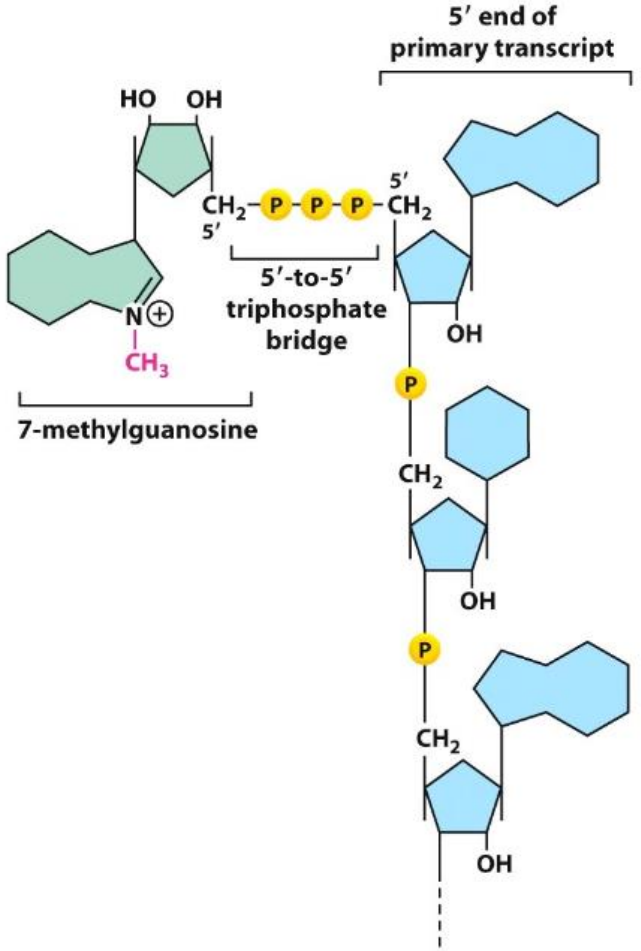
Procariotos

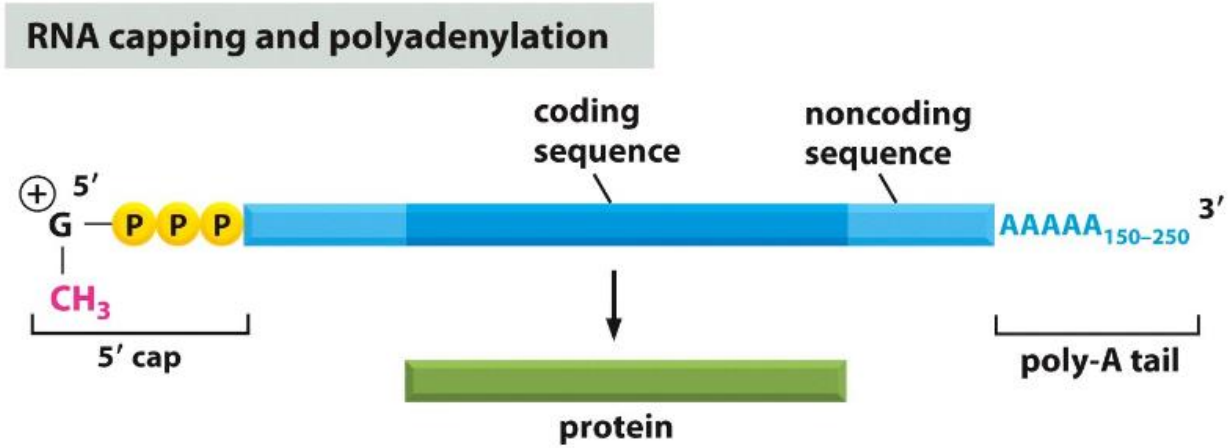


Eucariotos



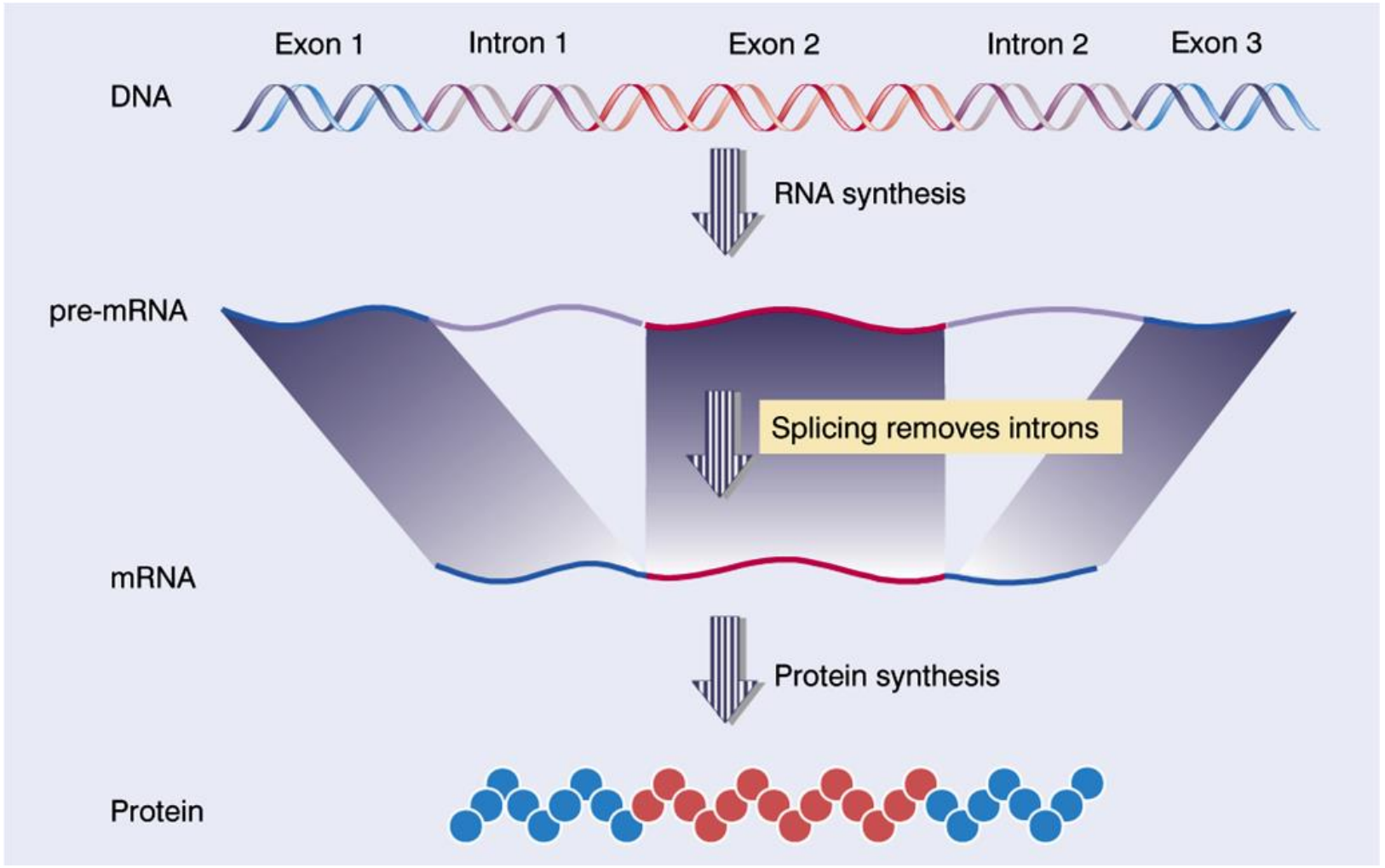
Capping e poli-adenilação de mRNAs



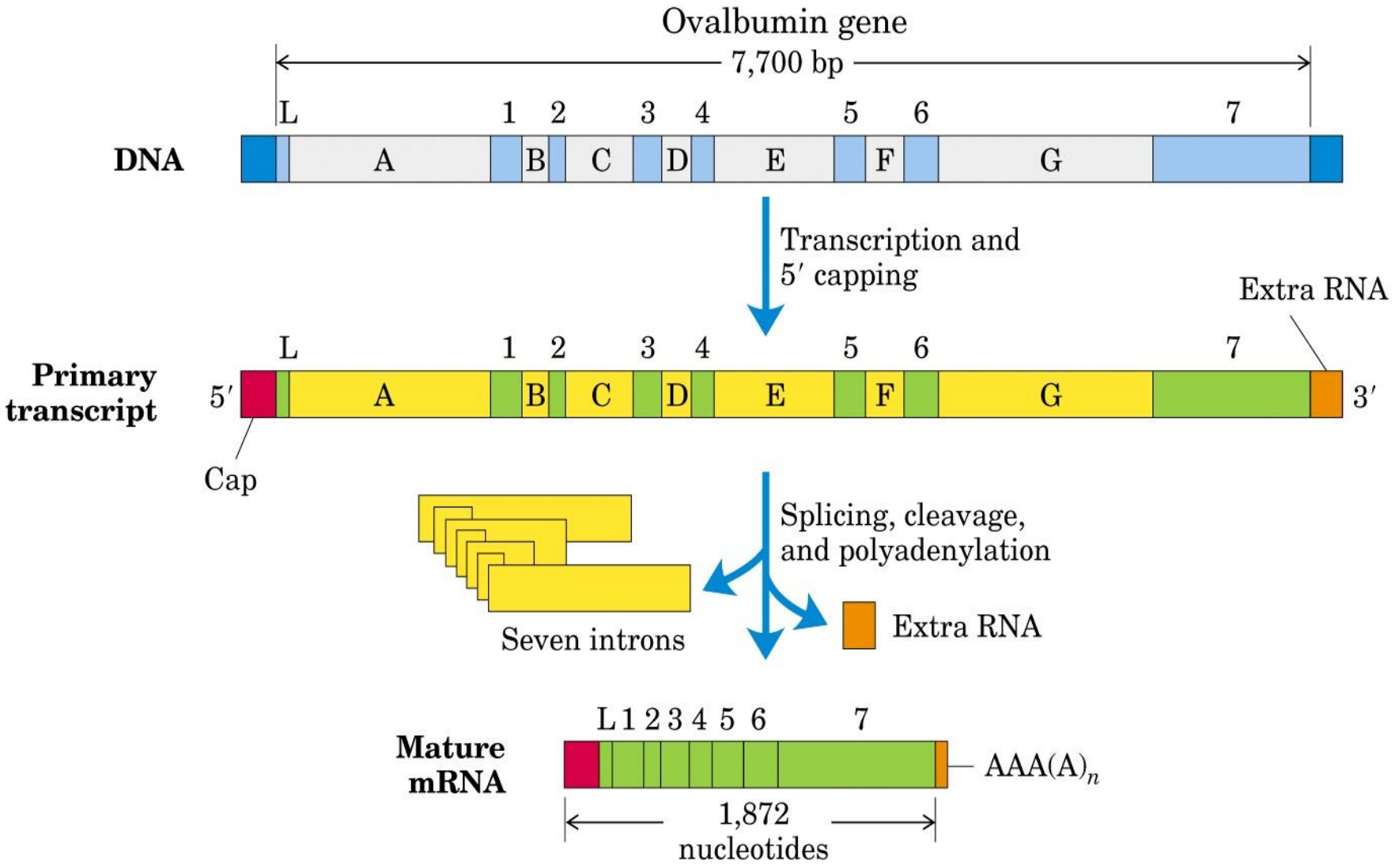


Protegem RNA de degradação
Regulam meia-vida do mRNA
Facilitam identificação de mRNA intacto
Identificam mRNA para transporte ao citosol
Identificam mRNA para tradução pelo ribossomo

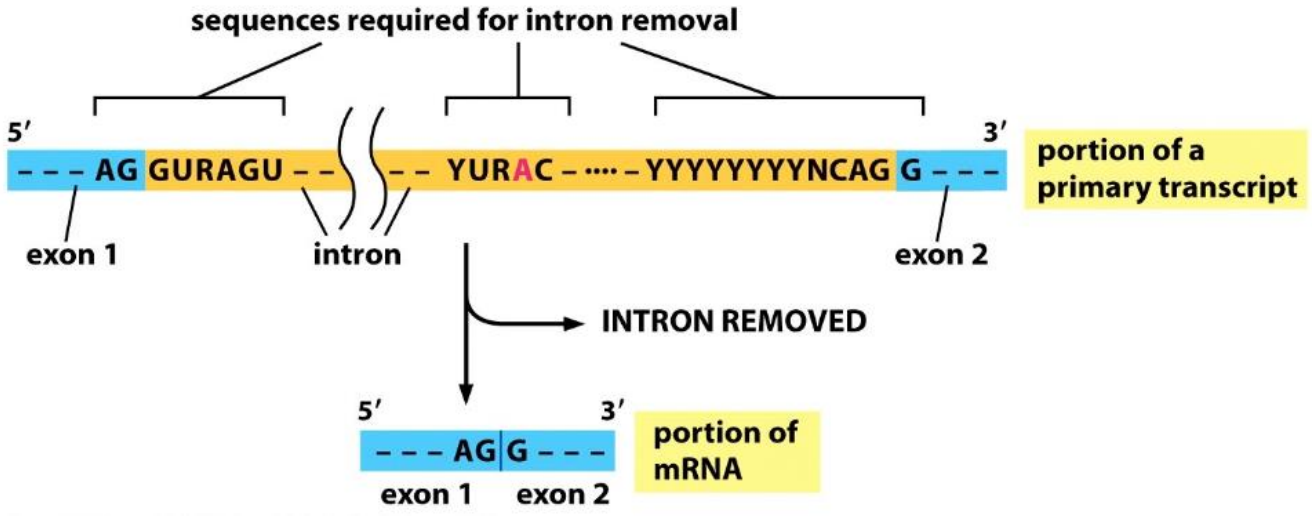
Splicing de mRNAs

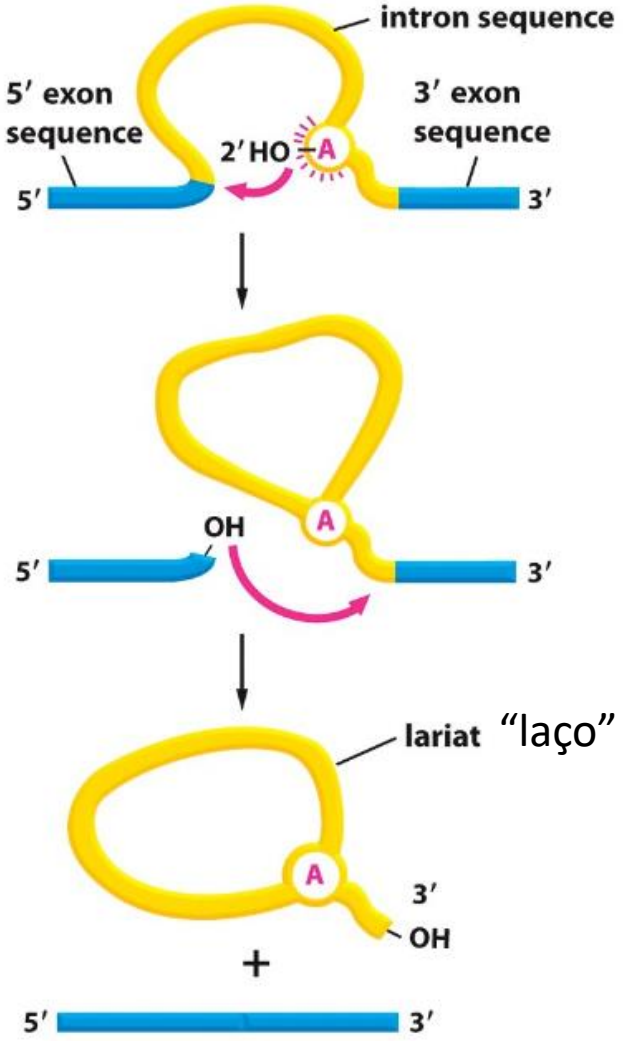


Splicing de mRNAs



Splicing de mRNAs



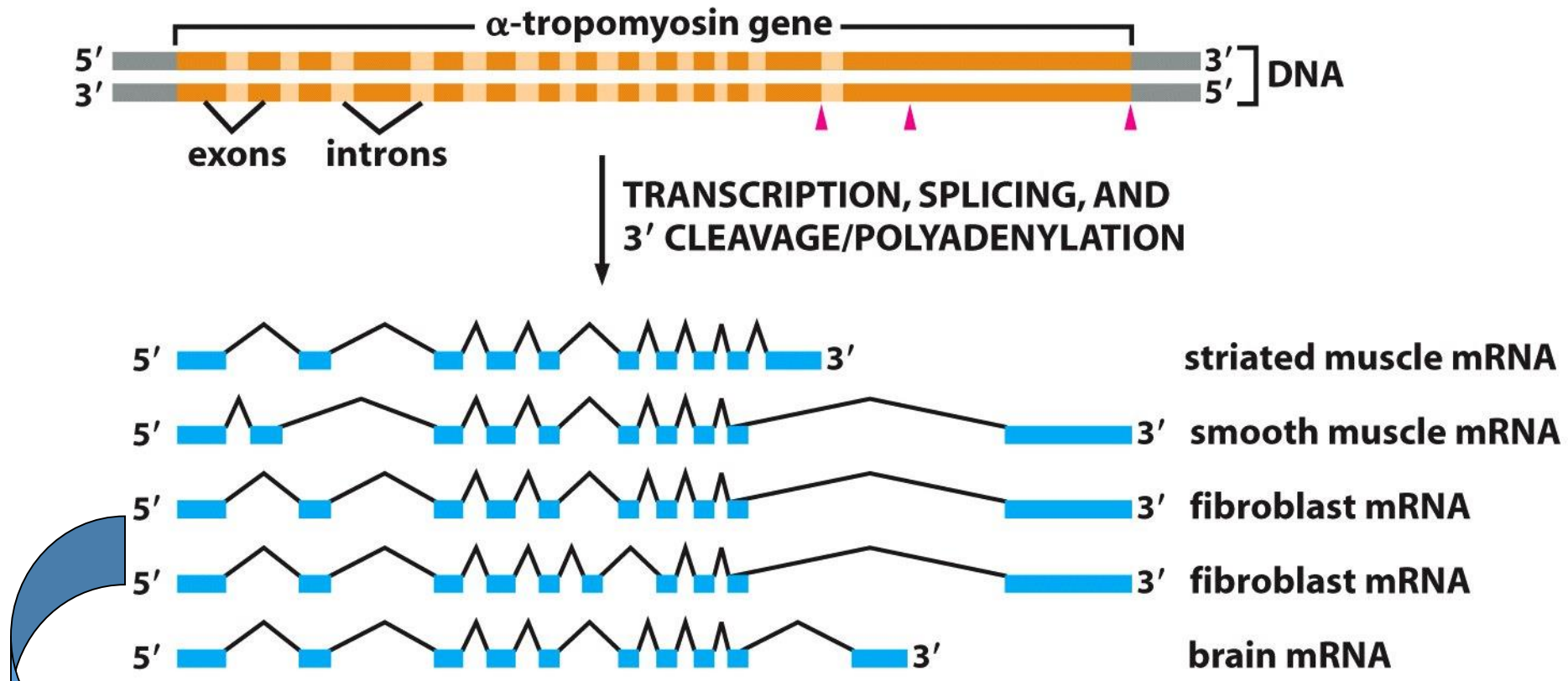


"laço"

Catalizado por complexos de ribonucleoproteinas (RNA+proteína) chamados coletivamente de spliceossomo

Assim como no ribossomo, o RNA tem atividade catalítica

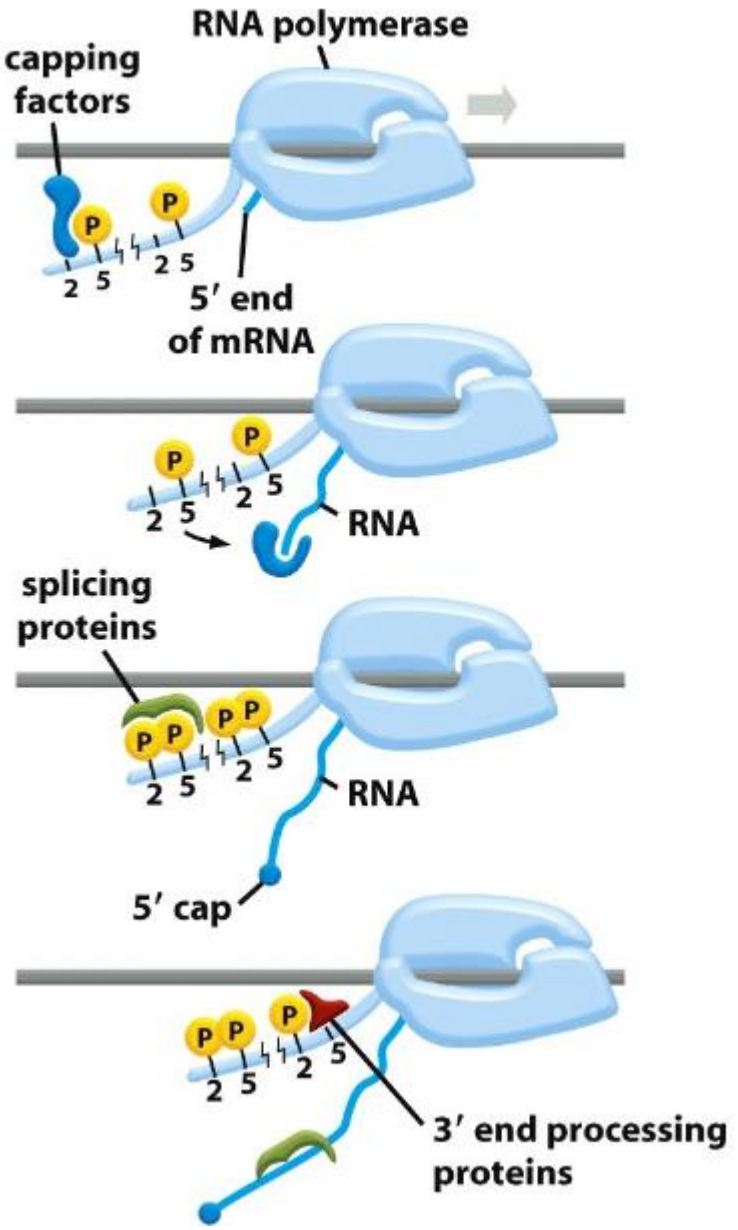
Splicing alternativo de mRNAs



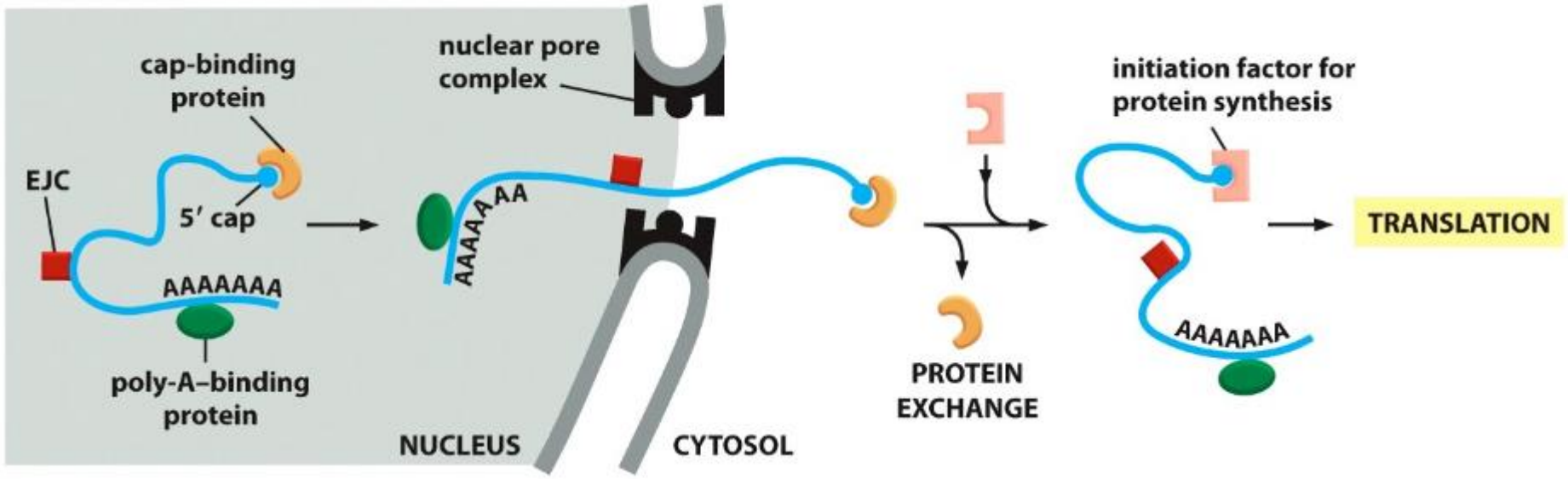
Isoformas/variantes de splicing

A maioria dos genes humanos apresentam splicing alternativo

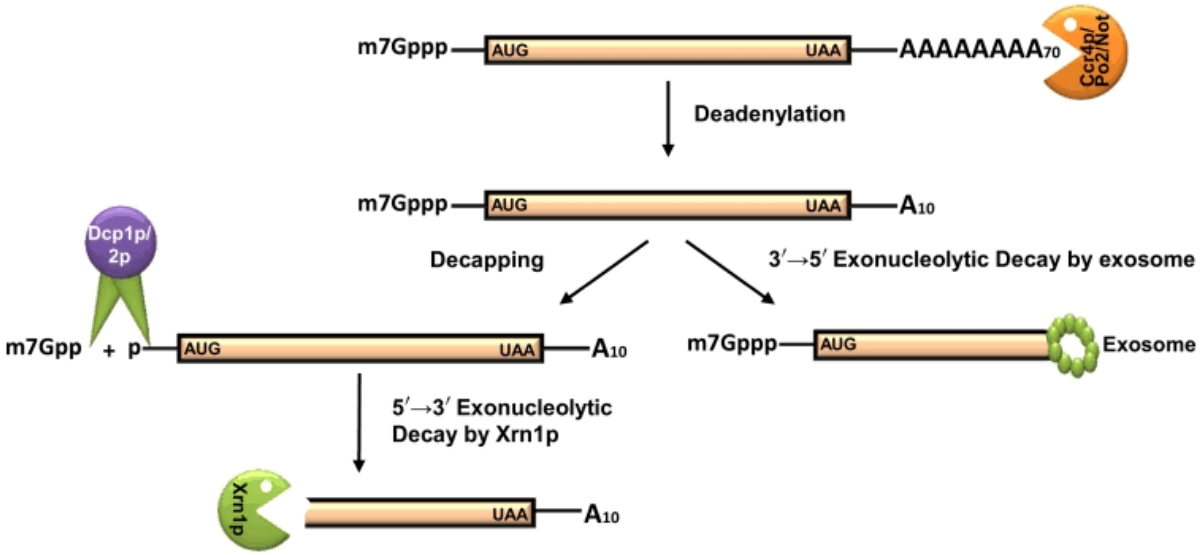
Capping, splicing e poli-adenilação são eventos co-transcricionais



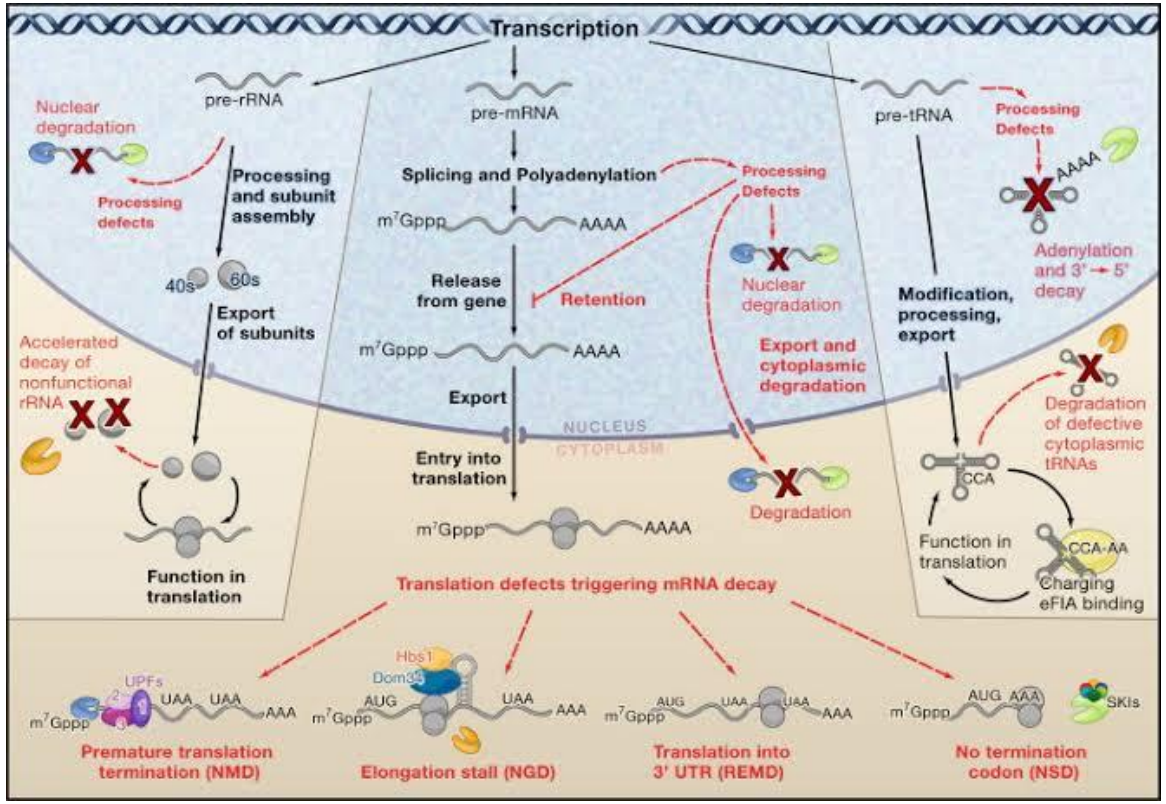
mRNAs maduros são exportados para o citosol



A estabilidade e qualidade do mRNA é controlada

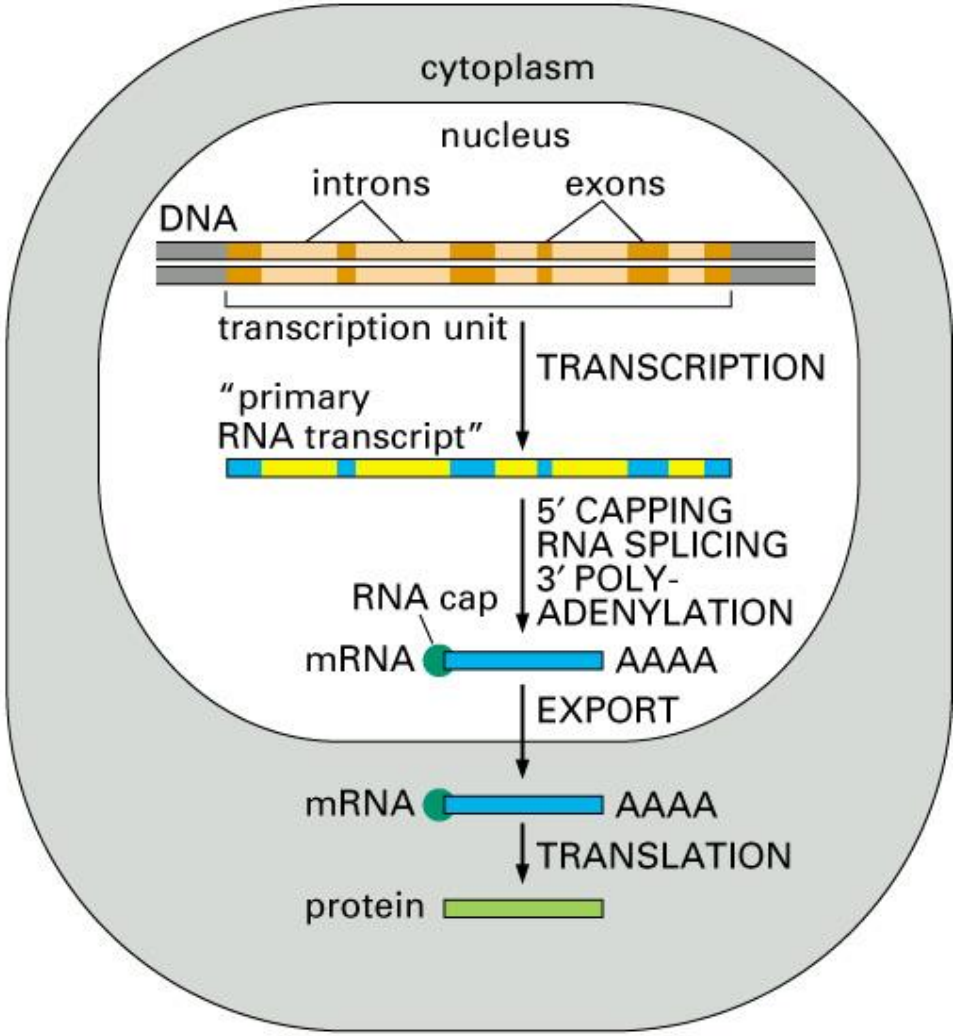


Degradação de mRNA

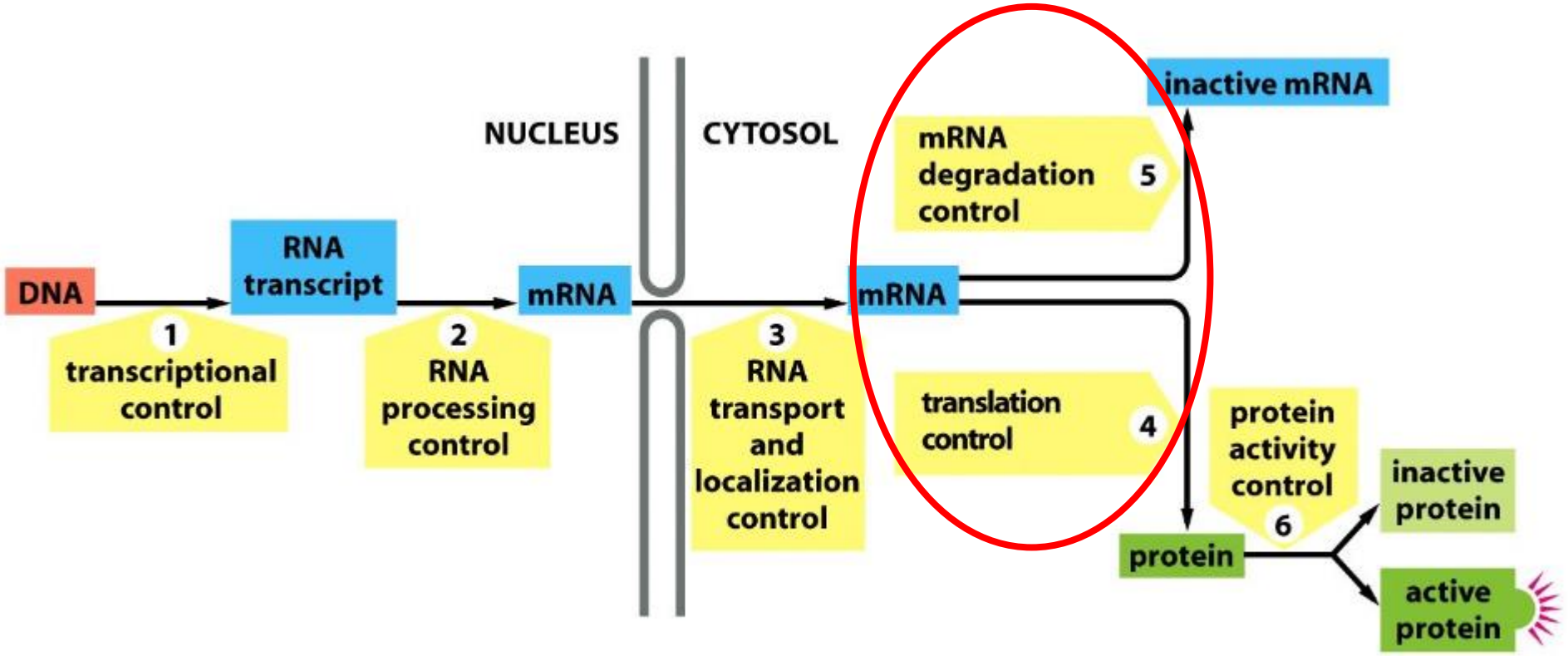


Controle de qualidade do mRNA (e outros RNAs)

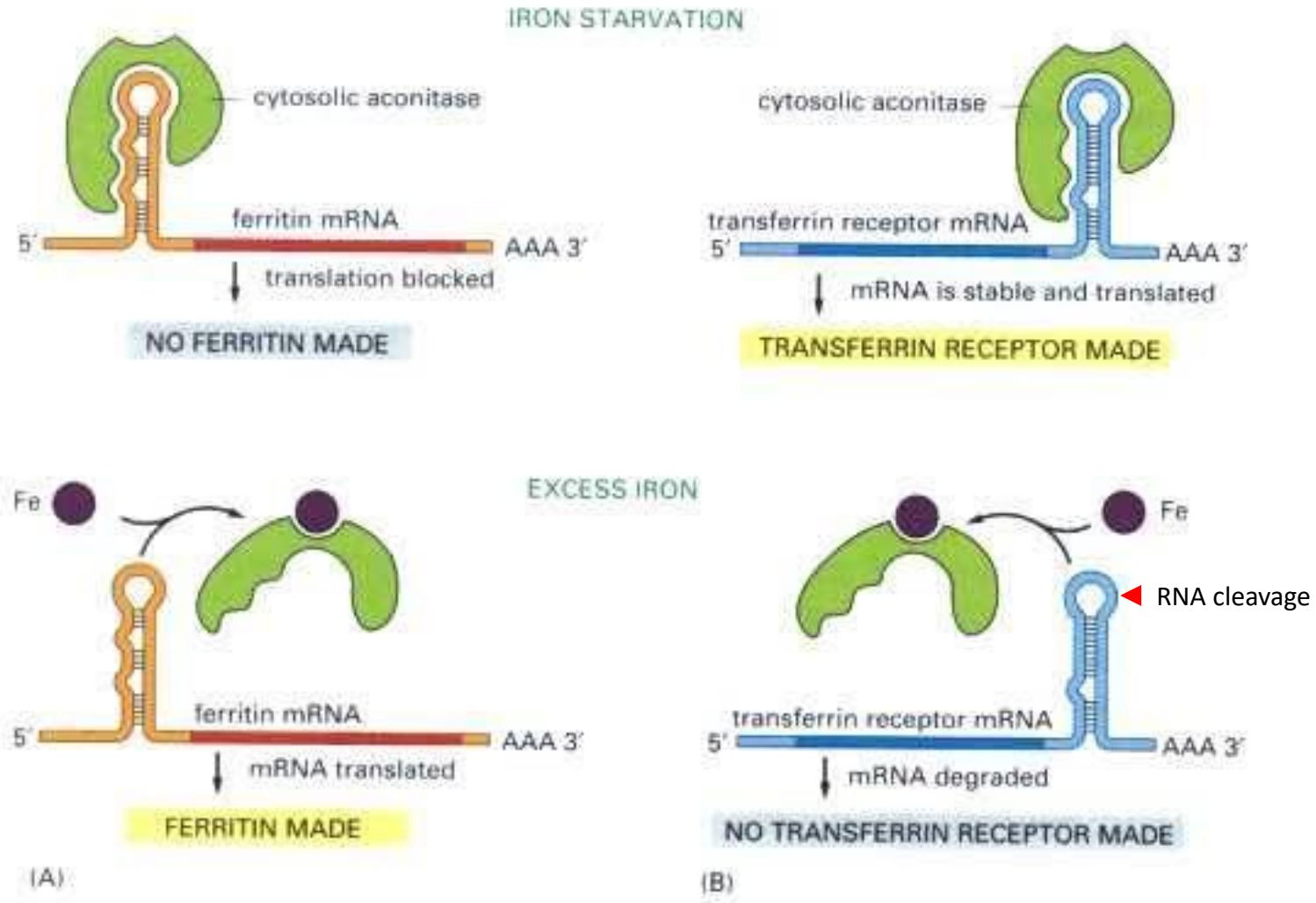
Processamento de mRNA



Regulação da Expressão Gênica



Degradação de RNA e regulação da tradução em uma mesma resposta



Ferritina: “Depósito” intracelular de Ferro

Transferrina: Transportador de Ferro pela membrana

Videos sobre Controle da Expressão Gênica e Processamento de RNA

http://highered.mheducation.com/olcweb/cgi/pluginpop.cgi?it=swf::535::535::/sites/dl/free/0072437316/120080/bio28.swf::Transcription%20Complex%20and%20Enhancers

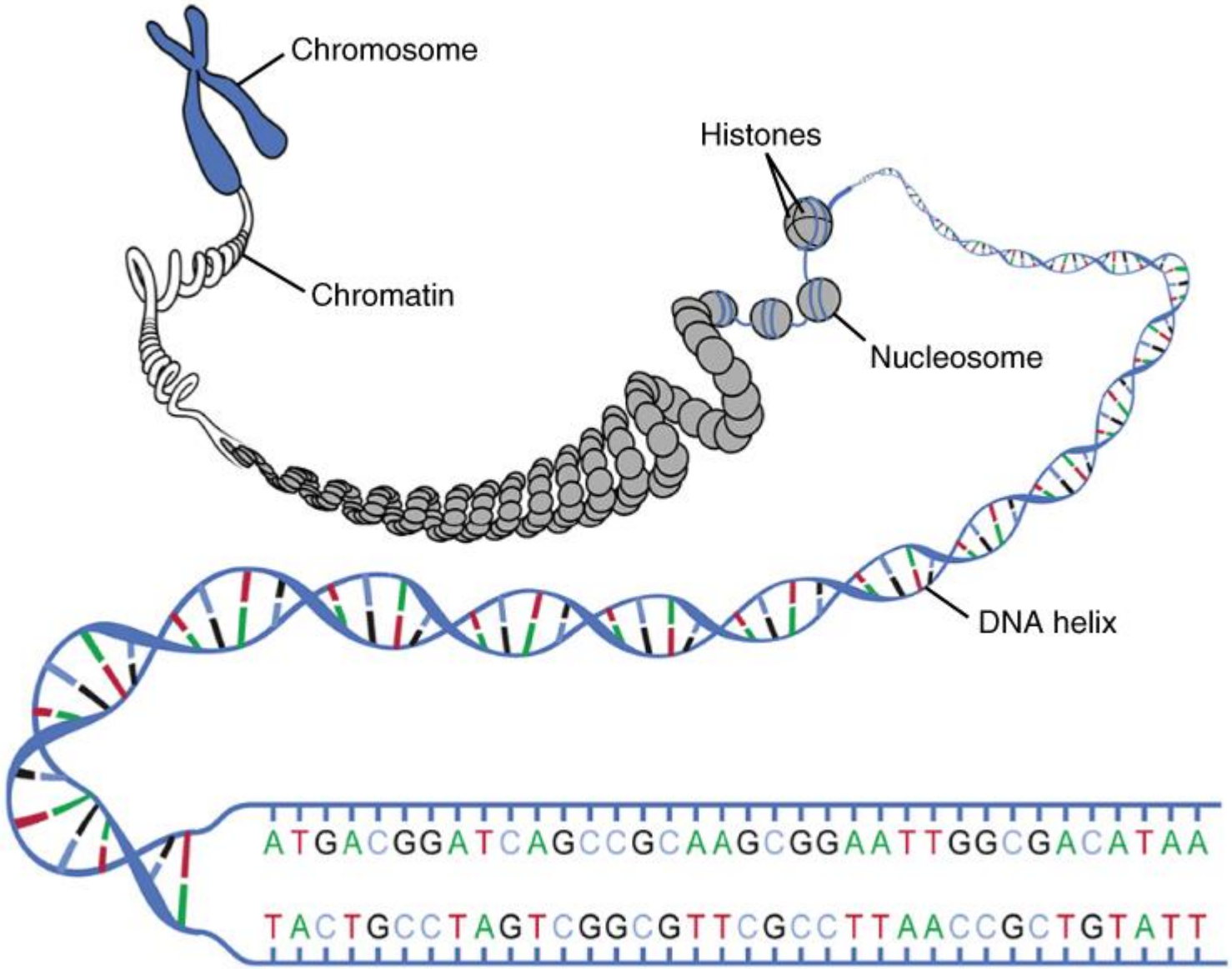
http://highered.mheducation.com/olcweb/cgi/pluginpop.cgi?it=swf::535::535::/sites/dl/free/0072437316/120080/bio31.swf::Control%20of%20Gene%20Expression%20in%20Eukaryotes

http://highered.mheducation.com/olcweb/cgi/pluginpop.cgi?it=swf::535::535::/sites/dl/free/0072437316/120077/bio25.swf::Processing%20of%20Gene%20Information%20-%20Prokaryotes%20versus%20Eukaryotes

http://highered.mheducation.com/olcweb/cgi/pluginpop.cgi?it=swf::535::535::/sites/dl/free/0072437316/120069/bio06.swf::How%20Intracellular%20Receptors%20Regulate%20Gene%20Transcription

http://highered.mheducation.com/olcweb/cgi/pluginpop.cgi?it=swf::535::535::/sites/dl/free/0072437316/120077/bio30.swf::How%20Spliceosomes%20Process%20RNA

Aula que vem


Chromosome
Chromatin
Histones
Nucleosome
DNA helix
ATGACGGATCAGCCGCAAGCGGAATTGGCGACATAA
TACTGCCTAGTCGGCGTTCGCCTTAACCGCTGTATT