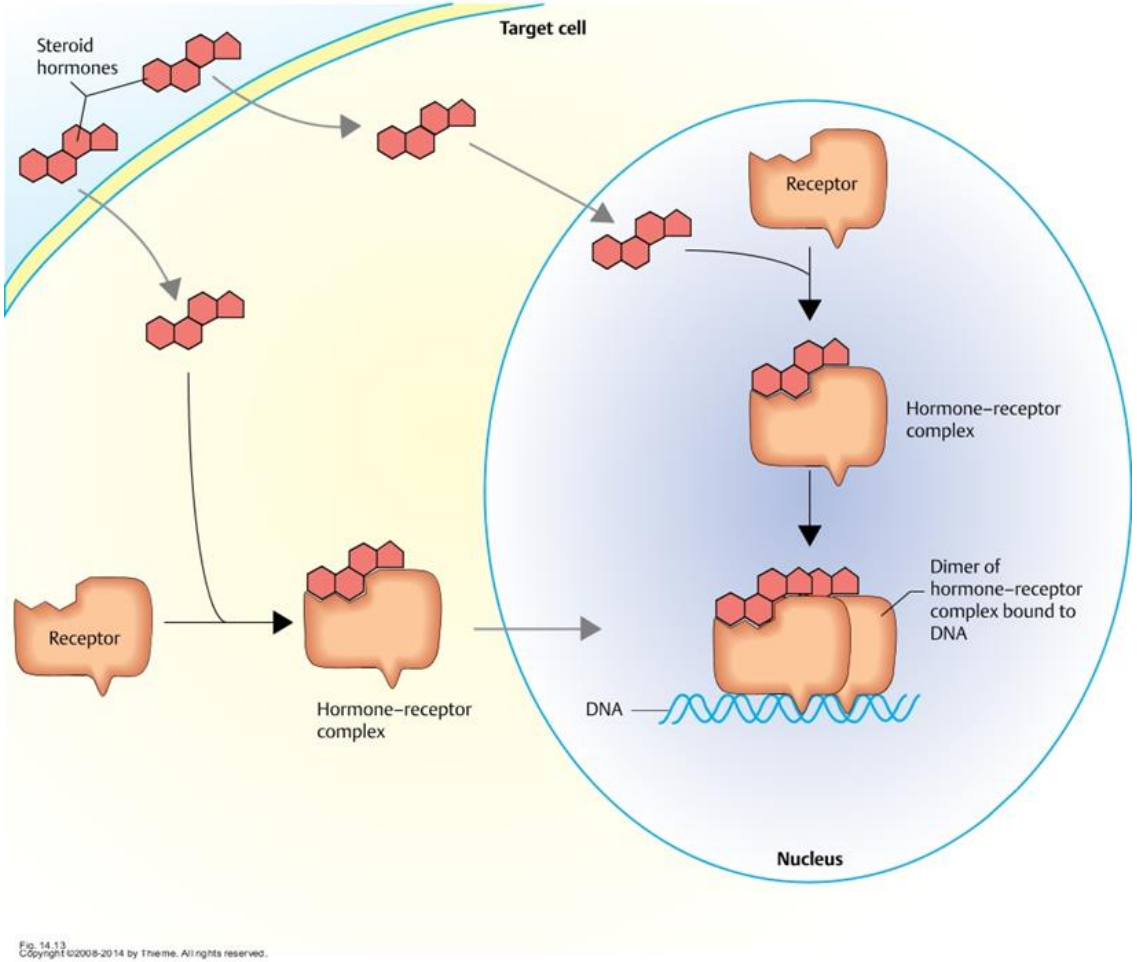
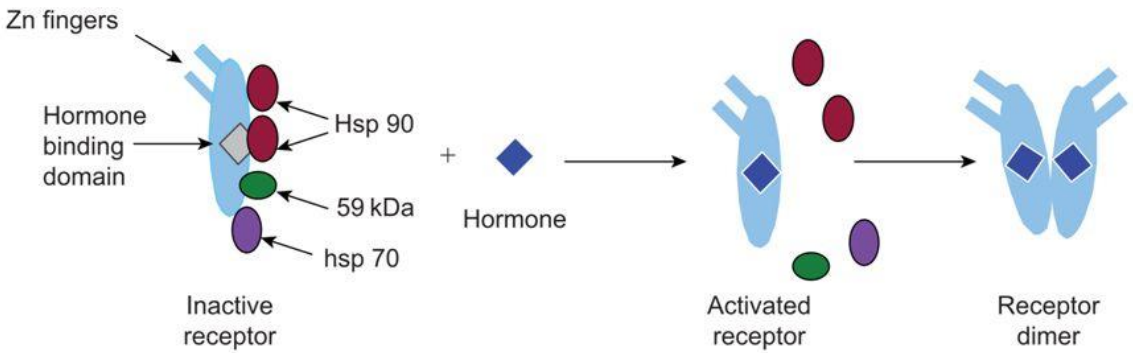
# Gene Expression

# Example of a transcription factor – steroid hormone receptor



# Activation of Steroid Hormone Receptors




- Inactive receptors associated with other proteins react with hormone, shed their associated proteins, and change their conformation
- They can then form dimers that bind DNA and a variety of nuclear peptide regulators of gene transcription

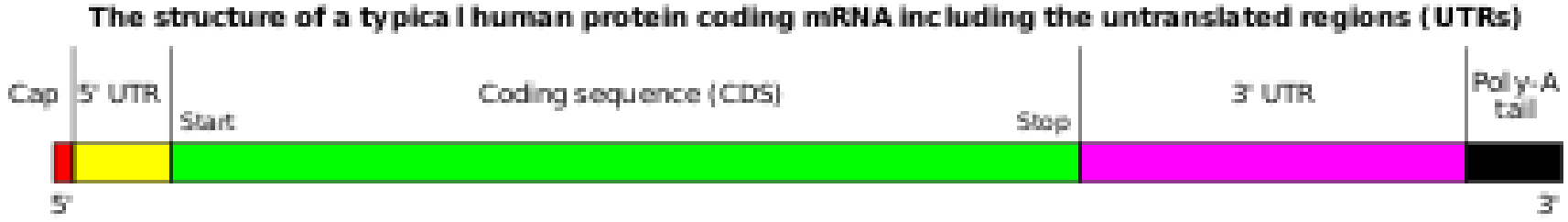
# Eukaryotic mRNA processing

# Differences in gene expression between prokaryotes and eukaryotes -3

- Bacterial messenger RNA is translated as without undergoing modifications
- Eukaryotic messenger RNA undergoes splicing and processing

# In eukaryotes messenger RNA undergoes several steps of post-transcriptional modification

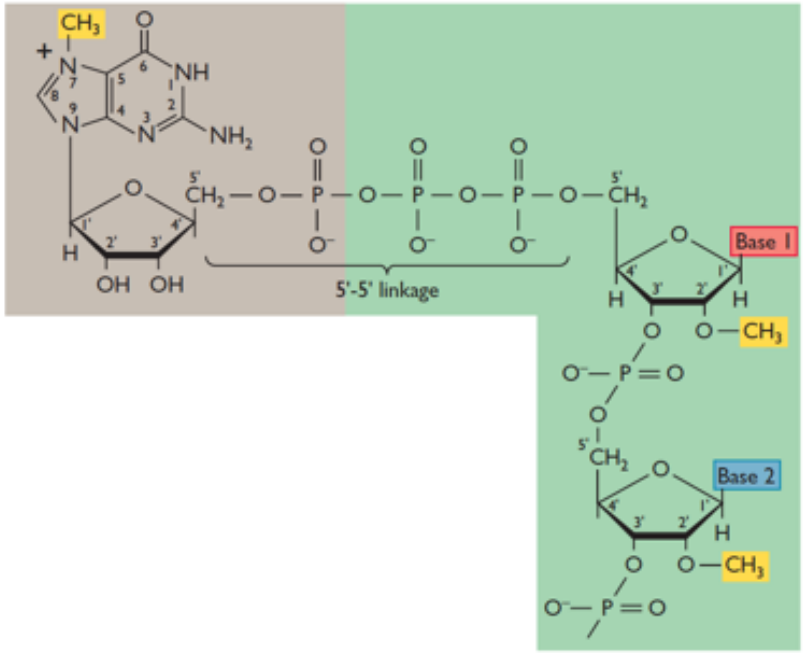
- Post-transcriptional modification is the process in eukaryotic cells where primary transcript RNA is converted into mature RNA.
- The process includes three major steps: addition of a 5' cap, addition of a 3' poly-adenylation tail, and splicing.



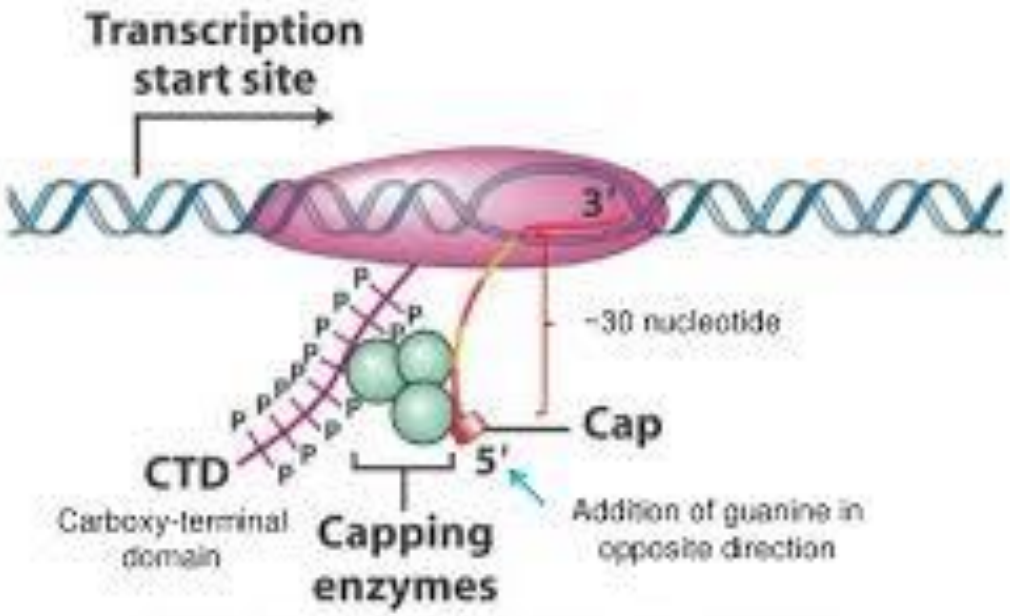
# 5’-capping

- the five-prime cap (5’ cap) is a specially altered nucleotide on the 5’ end of precursor messenger RNA.

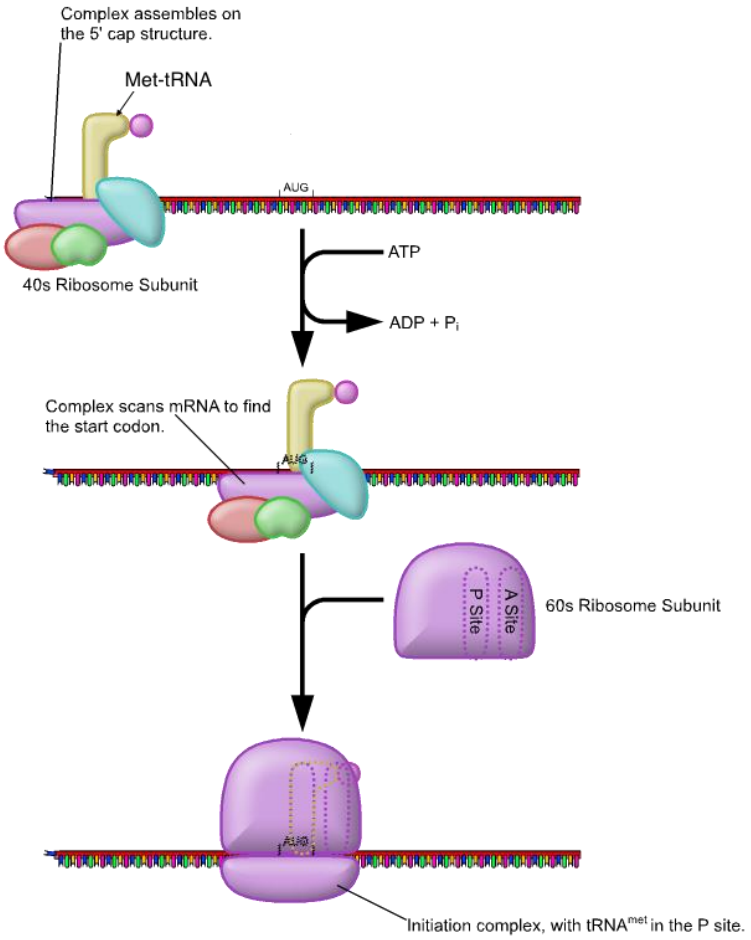
**5’-cap structure**



Co-transcriptional capping



# Translation pre-initiation complex binds to 5’cap of mRNA



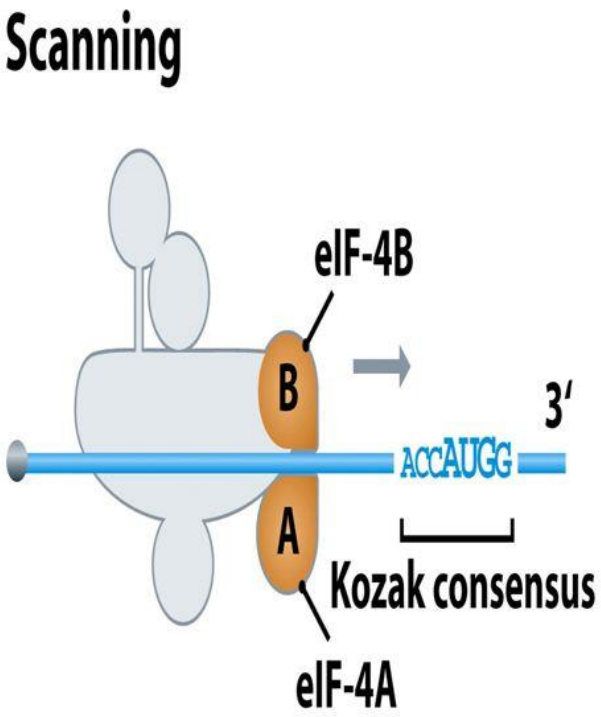



Figure 13.16b *Genomes 3* (© Garland Science 2007)

## 13-2. (Cont.) Translation initiation in eukaryote.

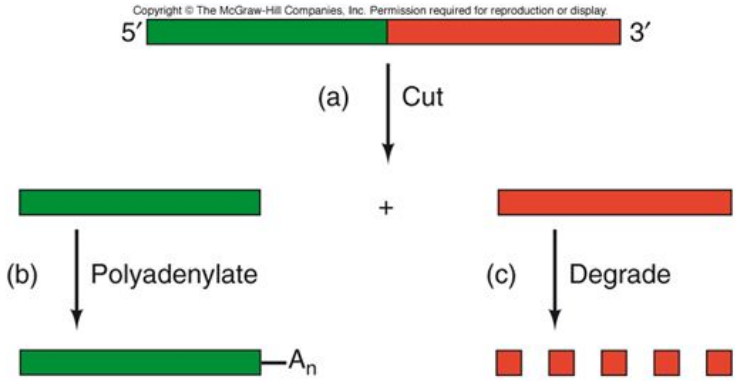
Preinitiation complex scans along mRNA until it reaches the initiation codon (a few tens or hundreds nt downstream & located within Kozak consensus sequence);
large subunits then attach.

# 3’ polyadenylation

- Polyadenylation is the addition of a poly(A) tail to a messenger RNA. The poly(A) tail consists of multiple adenosine monophosphates.
- The poly(A) tail is important for the nuclear export, translation, and stability of mRNA.

# Basic Mechanism of Polyadenylation

- Transcription of eukaryotic genes extends beyond the polyadenylation site




- The transcript is:
  - Cleaved
  - Polyadenylated at 3'-end created by cleavage