MCDB 3500
Exam #3
Fall, 2004

75 minutes, closed everything; be pithy!

Name KEY

ID_____

Q 1 (20 points)_____

Q 2 (20)_____

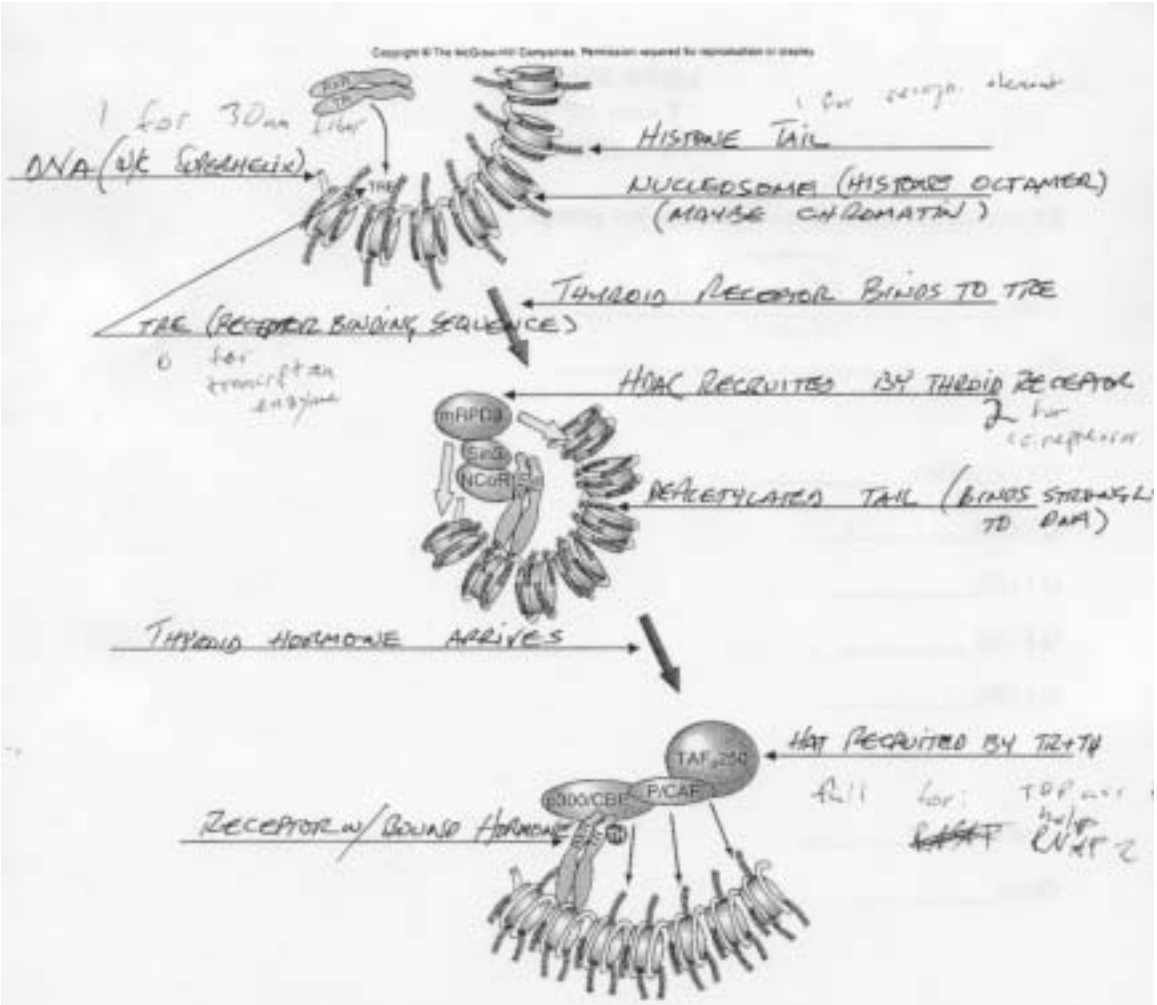
Q 3 (20)_____

Q 4 (20)_____

Q 5 (20)_____

Total (100)_____

Grade_____



1. By writing on each arrow, explain the structure or the process being pointed out..

2. Define:

Bromodomain

PROTEIN DOMAIN (SEPARATELY FOLDED) THAT BINDS PART OF PROTEIN
LYSCAC.

Acetylation

TYPICAL MODIFICATION OF LYSINE IN HISTONE TAILS.

RNA Induced Silencing Complex (RISC)

THE GROUP OF PROTEINS THAT BINDS SMALL INTERFERING RNA'S TO IMPLEMENT THE SEQUENCE SPECIFIC PART OF RNAi (EG., DEGRADATION)

Trans-splicing

SPLICING TOGETHER EXONS FROM 2 DIFFERENT RNAS

Remodeling

MOVING NUCLEOSOMES OR OTHERWISE CHANGING THE OVERALL STRUCTURE OF CHROMATIN

Pioneer Polymerase

THE FIRST POL II TO CROSS A PREVIOUSLY SHUT OFF GENE; IN CHARGE OF MODIFICATION MOVING NUCLEOSOME & OTHER CHANGES THAT ↑ EXPRESSION.

Histone H1

THE HISTONE THAT TACKS DOWN DNA EXITING THE SUPERHELIX ON THE HISTONE OCTAMER.

Branchpoint bridging protein

THE SR PROTEIN THAT BINDS THE BRANCH POINT.

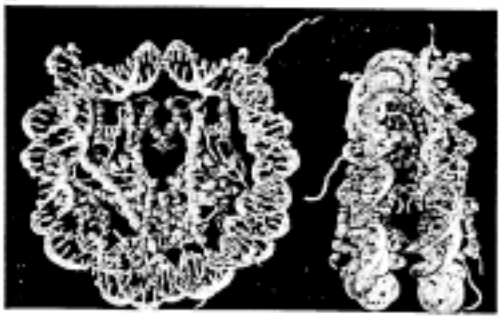
30 nm fiber

THE MAJOR STRUCTURAL FORM OF CHROMATIN; A SOLENOID OF NUCLEOSOMES, IN SOME MODELS

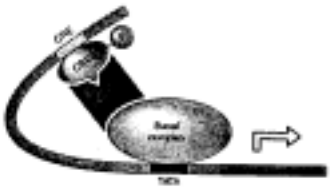
RNA interference (RNA_i)

NEGATIVE MODULATION OF EUKARYOTIC GENE EXPRESSION USING SMALL DS RNAS TO PROV SEQUENCE SPECIFICITY. DOUBLE STRANDED

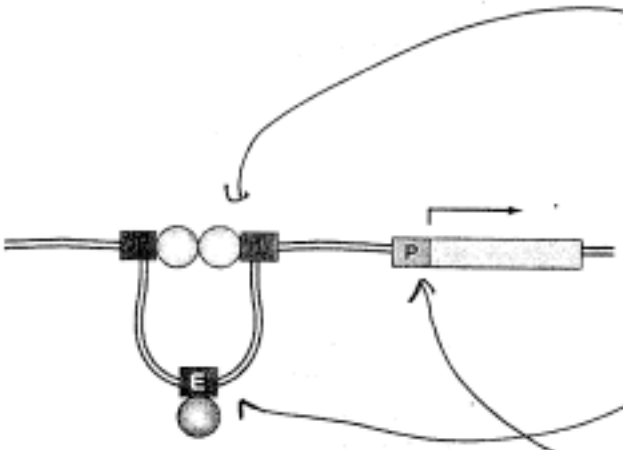
3. Beside each of the five pictures below, name the structure shown and explain its function briefly, but in sufficient detail that we can see that you understand it.



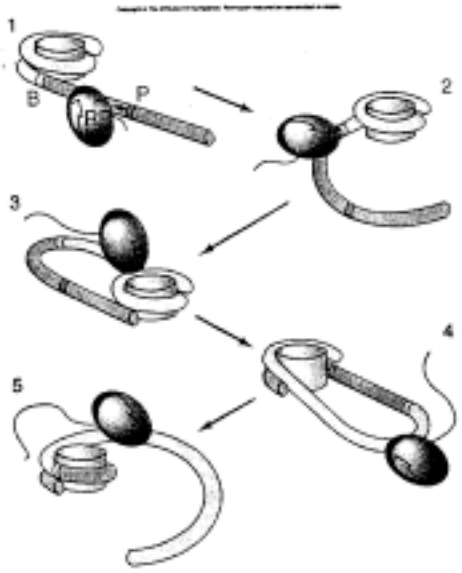
THE NUCLEOSOME WITH 140 BP OF DNA WOUND AROUND IT; THE MAJOR SUBUNIT OF CHROMATIN STRUC



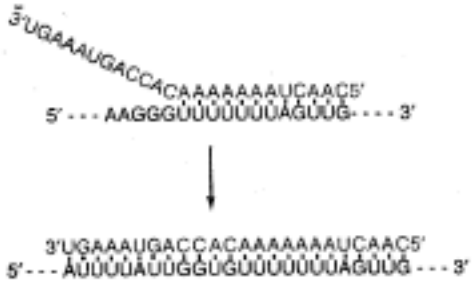
THE CREB BINDING PROTEIN MEDIATOR, WHICH CONVEYS ENHANCER EFFECTS TO RNA POL II BASAL COMPLEX.



AN INSULATOR; ISOLATING AN ENHANCER SO IT DOES NOT STIMULAT A PROMOTER



How RNA Pol can move a nucleosome upstream as it passes.



RNA Editing, with a guide RNA on top directing the insertion of unencoded U's in the mRNA beneath.

4. RNA processing short answers

a. How do spliceosomes select the particular A nucleotide used at the branch point?

IT IS BULGED OUT OF A HELIX FORMED WITH U2 RNA INSIDE U2 SnRNP.

b. Explain how capping and poly A addition interact with splicing.

5' 3'

EACH STIMULATES SPLICING OF THE NEAREST INTRON (ABOVE).

c. How is the C Terminal Domain of RNA Pol II involved in splicing?

IT IS THE SITE OF ASSEMBLY FOR SPLICING MACHINERY.

d. Draw the structure seem in the electron microscope after a processed message that had one intron is hybridized to double-stranded genomic DNA that extends outside the transcribed region on both sides. Hint: you must keep track of two strands of DNA and one strand of RNA: it may help to note polarity.

e. How do spliceosomal splicing and self-splicing differ with regard to the first covalent reaction that frees the 5' exon ?

GROUP I (COULD TALK ABOUT GROUP II)

SPLICEOSOMAL - BRANCH POINT A 2'-OH ATTACKS 3' END OF 5' EXON

FREE G NUCLEOTIDE ATTACKS 3' END OF 5' EXON.

BRANCH Po A (A PART THE GROUP II INTRON ITS ATTACKS 3' E OF 5' EXON.

5. Describe 5 ways in which chromatin isolated from a living cell's nucleus might differ in structure from histones and DNA assembled in a test tube, and explain how each of your differences increases transcription and directs transcription to particular genes.

a. Nuclease Sensitive spots
b. Remodeling
c. DNA that resists winding around nucleosomes.

1. Some nucleosomes in particular regions will not be present.
   - opens up promoters

2. Some promoters will have bound factors: enhancers, TFIID, etc.
   - prepares promoter for Pol II assembly

3. Might find Pol II prestaged for transcription as holoenzyme
   - ready to fire

4. Would find modified histones instead of unmodified or arbitrarily modified histones in promoter nucleosomes
   a) structure 'loosened' for transcription
   b) Restrictive modifications removed from histone tail
   c) Proteins that make restrictive modifications will have departed from real expressed genes

5. DNA from active chromatin will be demethylated (no Me-C).
   - unmodified is transcribed better

There are many ways to put these things together to get 5 valid differences, & even other differences you might list.