

Sample exam questions from Dr. Furneaux (8 minutes per question)

1. Transcription of mRNA by RNA polymerase proceeds "5 to 3". Explain what this statement means and outline the experiments that support it.
2. Outline the biochemical experiment that "cracked the genetic code".
3. Outline the accepted mechanism for the formation of aminoacyl tRNA.
4. Describe how you might identify an RNA-dependent RNA polymerase in extracts of animal cells.
5. Describe how Ptashne first "purified" the lambda repressor as told in the Great Experiments series.
6. In a simple diagram outline the structure of a typical zinc finger protein highlighting the residues essential for interaction with DNA.
7. Using a diagram, outline how tryptophan regulates the initiation of transcription.
8. Describe how you would identify and purify a new protein thought to regulate transcription.
9. Using a diagram, outline how the 5' and 3' ends of mRNA are thought to interact prior to translation.
10. Outline and critique the current model for the insertion of U residues in trypanosomal mRNA.
11. Describe the series of events that result in the polyadenylation of mammalian mRNA.
12. Outline a model that explains the degradation of mRNA by Shaw-Kamen elements.
13. After a few emboldening cocktails at the MBB Happy Hour, an ambitious student decides to see if he/she can identify a human homologue of the bacterial Rho protein. Describe their possible experimental approach.
14. What is the "key" experiment described by Roberts that proved the "amazing sequence arrangement at the 5' ends of adenovirus 2 mRNA"?
15. Outline the current model for the action of sex-lethal in the alternative splicing of tra mRNA.
16. The Patterson model and the Zamore-Tuschl model both seek to explain the biochemical mechanism of siRNA action. Indicate the one do you think is closer to 'reality' and outline the key experiment(s) that support your view.
17. In a recent paper, Zamore's lab reports that the let7mi RNA particle is catalytic. Summarize his evidence for this.
18. After way too many cocktails at the MBB Happy Hour, a student colleague decides to reinvestigate the old "jumping RNA polymerase Model" (This model sought to explain the "processing" of noncontiguous DNA sequence information.) Would you talk your colleague out of this? Either way, explain your rationale.
19. In a diagram, summarize the critical feature of the lariat splicing intermediate.
20. Outline a mechanism by which RNA might catalyse the peptidyl transfer reaction.
21. Speculate in biochemical terms as to how a specific ubiquitin ligase (E3) might recognize its target protein.