

1-13 單選題(One point each)

1. A method is used to determine the relative quantity and size of RNA.  
(A) Eastern blot  
(B) Far-Western blot  
(C) Northern blot  
(D) Southern blot  
(E) Western blot
2. Which is **not** a DNA-binding domain?  
(A) Zinc finger  
(B) Helix-turn-helix  
(C) Helix-loop-helix  
(D) Leucine zipers  
(E) None of above
3. A method to correlate chromatin activity with the state of gene expression.  
(A) RNase protection assay  
(B) S1 nuclease protection assay  
(C) ELISA  
(D) DNAase I hypersensitive assay  
(E) None of above
4. Which statement about immune diversity is **not** true?  
(A) T-cell receptors are related to immunoglobulins.  
(B) Immunoglobulin gene are assembled from their parts in lymphocytes.  
(C) Allelic exclusion is triggered by fruitless rearrangement.  
(D) Somatic mutation generates additional diversity.  
(E) Early heavy chain expression can be changed by RNA processing.
5. Which statement about genome is **not** true?  
(A) Eukaryotic genes are often interrupted.  
(B) Exon sequences are conserved but introns vary.  
(C) Some DNA sequences code for more than one protein.  
(D) Gene can be mapped by restriction cleavage.  
(E) None of above.



6. Which statement about protein synthesis is **not** true?
- (A) Initiation on prokaryotic mRNA need 50S subunits.
  - (B) Initiation involves base pairing between mRNA and rRNA.
  - (C) Small subunits scan for initiation sites on eukaryotic mRNA.
  - (D) Translocation moves the ribosome.
  - (E) None of above.
7. Which triplet codon represents stop (termination)?
- (A) UGU
  - (B) UGC
  - (C) UGA
  - (D) UGG
  - (E) UAC
8. Which statement about protein trafficking is **not** true?
- (A) Oligosaccharides are added to proteins in the ER only.
  - (B) Coated vesicles transport both exported and imported proteins.
  - (C) Receptors recycle via endocytosis.
  - (D) Protein localization depends on further signals.
  - (E) None of above.
9. Which statement about signal transduction is **not** true?
- (A) Channels form water-soluble paths through the membrane.
  - (B) G proteins can activate or inhibit downstream target protein.
  - (C) Cytokines IL4 and IFN $\gamma$  signal through STAT.
  - (D) Cyclic AMP signals through CREB.
  - (E) None of above.
10. At which phase of cell cycle the cells contain 4n DNA?
- (A) G1
  - (B) S
  - (C) G2
  - (D) M
  - (E) None of above

11. Which statement about apoptosis is **not** true?
- (A) First shown to be necessary for normal development in *C. elegans*.
  - (B) is programmed cell death.
  - (C) Triggered by a variety of pathways.
  - (D) Caspase protease are activated.
  - (E) Bcl2 is pro-apoptotic.
12. RNA polymerase I transcribes
- (A) mRNA
  - (B) rRNA
  - (C) small RNA
  - (D) tRNA
  - (E) tRNA and small RNA.
13. Which statement about protein localization is **not** true?
- (A) Post-translational membrane insertion depends on leader sequences.
  - (B) Chaperones may be required for protein folding.
  - (C) Protein is degraded by proteasomes.
  - (D) Bacteria use both co- and post-translational translocation.
  - (E) None of above.
14. Briefly describe (2 points each)
- (A) Allelic exclusion
  - (B) Ectopic expression
  - (C) Histone deacetyltransferase (HDAC)
  - (D) Open reading frame (ORF)
  - (E) Polymerase Chain Reaction (PCR)
  - (F) Transgenic animals
15. 最近有一種在玉米田新發現類似蜜蜂的昆蟲稱為 Paleoicetelokreain (PLK) 正危害著人類，在叮咬後可引起快速死亡。你們研究室強烈懷疑它可產生一種過敏性極高的毒素可引起 anaphylaxis shock 而導致死亡。你被教授指派去找出此種過敏原的成份，基於使命感，勤奮的你一個月不眠不休，週一至週日 7-11 的努力下發現此種昆蟲毒液中在 SDS-PAGE 電泳下有至少十條以上的蛋白 band，其中你強烈懷疑之中的分子量 36 KD 之蛋白可能是主要的過敏原（不一定只憑直覺）。你將這 36 KD 之蛋白自 gel 中切下來進行 microsequencing 並且已經獲得 N terminal 10 amino acid 之 sequence。請問：你如何進一步研究這分子量 36 KD 之蛋白可能是什麼？（如何得知其 gene 為何）（10 分）

16. Generation of combinatorial diversity among immunoglobulins involves: (複選，也可能只有一個答案) (3 分)

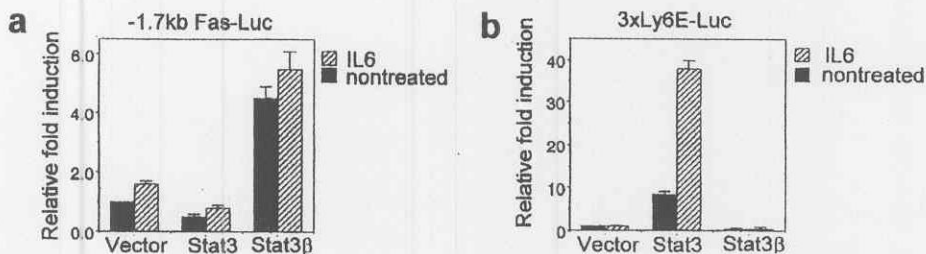
- (A) mRNA splicing
- (B) RAG-1 and RAG-2 gene
- (C) recombination signal sequences
- (D) DNA dependent protein kinase
- (E) ku gene

17. 解釋名詞：(12 分)

- 甲、Homologous recombination
- 乙、Mismatch repair
- 丙、Sn RNP
- 丁、MAP kinase

18. An outbreak of SARS (severe acute respiratory syndrome) in South Asia has claimed 17 lives recently. A deadly virus is suspected to cause the SARS. The RNA virus, paramyxovirus appears resistant to common treatment, indicating that the virus may be a mutant strain. If you were a researcher working in the CDC (Center for Disease Control and Prevention), how would you identify the mutations in the RNA genome of the virus causing SARS (assuming that you have enough wild type and mutant strain virus on hand)? Please briefly describe the rationale of the approach (15 points)

19. The following figure is a luciferase activity assay for promoter of Fas (a) and Ly6E, an interferon inducible gene (b). Y-axis indicates relative fold induction after treatment of cells with or without IL-6. X-axis indicates transfection of vector alone, STAT3 or STAT3 $\beta$  expression plasmid in the cells. Please briefly describe the effect of IL-6 and STAT3 or STAT3 $\beta$  on the transactivation of Fas or Ly6E-reporter gene. (10 points)



20. 人類染色體全部 DNA 序列的初稿已在 2001 完成，其中有一些意外的發現，請列出你（妳）所知人類 DNA 序列的任何兩點特性。（6 分）
21. 請敘述 DNA replication fork 上的各種蛋白及其在 DNA replication 之功能。（Bacterial DNA replication fork 或 mammalian DNA replication fork 擇一回答即可）。（10 分）
22. 請就 ribosome 上的三個 tRNA binding-sites，解釋在蛋白合成（translation）時每個氨基酸加入的三個步驟。（9 分）

試題隨卷繳回

