

國立高雄大學九十四學年度研究所碩士班招生考試試題

系所組別：生物科技研究所

科目：英文

考試時間：100 分鐘

本科原始成績滿分 100 分

第一部份 閱讀測驗 每題 2 分 (請標明題號，並依題號順序作答)

Molting is the mechanism by which an animal sheds worn hair, skin, scales, feathers, or fur and develops a new body covering. Molting frequently takes place at a specific time each year known as the animal's molting season.

The process of molting varies with different animals. Some animals have a rigid exterior covering, called an exoskeleton, that is too inflexible to expand as the animal grows. These animals, including crabs, lobsters, and insects, must periodically shed their outer shell and form a new one. The old exoskeleton becomes separated by fluid that is secreted beneath it. A new, soft exoskeleton grows in folds beneath the old, detached covering. The animal presses against the old exoskeleton, causing it to split, and wriggles out. The new exoskeleton then unfolds and hardens. Caterpillars of several kinds of butterflies shed their skin as many as five times as they grow. Adult insects do not molt. Lobsters, crabs, and similar animals molt irregularly throughout life.

Many reptiles also molt throughout life. Snakes and lizards shed and replace their entire skin. Alligators and crocodiles shed and replace each of their scales individually. This pattern of molting is similar to that of birds.

Birds shed their feathers at least once a year and grow a new set. Some songbirds molt three times a year, but not all feathers are shed each time. A complete molt typically takes four to six weeks and occurs in late summer. Worn feathers are pushed out by new ones in a regular pattern. In most birds, a feather used for flying is shed only after the one next to it is partly regrown. Thus, the bird maintains its ability to fly. Ducks, geese, and swans shed all their flight feathers at once and are flightless during their molting season. Large birds may require more than a year to molt completely, or they may molt almost continuously. In many birds, molting also plays an important part in courtship. Old, dull feathers are replaced by brightly colored ones that help attract a mate.

1. What main subject of this passage is
(A) the seasonal aspects of molting
(B) molting by songbirds and alligators
(C) the phenomenon of molting among animals
(D) the physiological aspects of molting.
2. According to the article, exoskeleton can be defined as
(A) The hard outer covering of molting animal
(B) The new soft outer covering of any molting animal
(C) The new rigid outer cover of an animal that has recently molted
(D) The exterior coverings of some molting animals
3. The word "it" in line 7 refers to
(A) The old exoskeleton
(B) The animal
(C) The new exoskeleton
(D) Folds beneath the old exoskeleton
4. It can be inferred from this passage that
(A) Some birds molt and some don't
(B) Some birds are unable to fly during their molting season
(C) Small birds molt gradually and large birds molt all at once
(D) Courtship triggers molting in songbirds
5. According to the passage, the molting season
(A) varies from one year to the next in most animals
(B) varies in length according to an animal's age and sex
(C) varies from species to species
(D) is continuous in larger marine mammals
6. The passage does not deal with
(A) reptilian molting
(B) avian molting
(C) crustacean molting
(D) mammalian molting
7. The word "irregularly" in line 11 could best be replaced by
(A) erratically
(B) unspecifically
(C) infrequently
(D) abnormally

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As a result of efforts to treat patients afflicted with severe epileptic seizures, doctors discovered that a beneficial effect could be achieved by surgically severing the corpus callosum which acts as an information conduit between the left and right hemispheres of the brain. Once the operation was performed, communication between the two sides of the brain ceased and they began to function independently. Psychological studies of split-brain patients has turned up some interesting findings.

While split-brain patients can receive and verbally describe information received only by the left hemisphere of the brain, they are unable to verbalize information received only by the right hemisphere of the brain even though they are able to demonstrate an understanding of the information through non-verbal means.

Some scientists have theorized that the specialization of the two halves of the brain into one with linguistic functions and one that is more adept at handling spatial and non-verbal information is the result of evolution as the brains of lower animals are bilaterally symmetrical rather than specialized. Others claim that this difference can be explained by man's development of language which, through evolution, has mostly involved the left hemisphere and detracted from its non-verbal capabilities.

Some studies of split-brain patients have revealed the startling possibility that each hemisphere has its own separate consciousness. Extrapolations of this have been used in attempts to explain the development of hysterically induced multiple personalities in young children subjected to abuse or trauma. The hypothesis is that, since the corpus callosum is not fully matured until about the age of ten, a child does not yet have a fully integrated personality. Therefore, a child may be about to compartmentalize multiple personalities in either hemisphere without communicating their existence to his normal waking consciousness.

8. What is the best suitable topic of this passage?
- (A) brain bilateralism
(B) brain surgery
(C) brain disease
(D) theories of brain function
9. According to the passage, man differs from lower animals in that
- (A) he has a two-hemisphered brain
(B) evolution has localized man's speech function in his left hemisphere
(C) evolution has localized man's speech function in his right hemisphere
(D) animal brains have specialized functions in each hemisphere
10. In line 1, the phrase "afflicted with" could be best replaced by
- (A) infected by
(B) suffering from
(C) contracted in
(D) trembling from
11. From reading the passage, it can be inferred that
- (A) the two hemispheres of the brain do not exchange information
(B) both hemispheres have linguistic functions
(C) the corpus collosum passes information between hemispheres
(D) epileptic seizures can cause multiple personalities
12. In line 3, the word "conduit" could best be replaced by
- (A) barrier
(B) signal
(C) channel
(D) seam
13. Split-brain therapy is used
- (A) as a standard treatment for epilepsy
(B) as an extreme measure used on some severe cases of epilepsy
(C) to diagnose multiple-personality disorder
(D) to offset the effects of neuro-lingual dysfunction
14. From the last paragraph of this passage, it can be inferred that
- (A) consciousness is not directly related to brain activity
(B) consciousness is a function of linguistic awareness
(C) it may be possible for two separate consciousnesses to coexist in the human brain
(D) epilepsy is an uncontrolled switching of consciousness between the two hemispheres

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Brucellosis, a bacterial infection characterized by extreme weakness, backache, chills, and headache is an occupational hazard for persons such as veterinarians, animal breeders, farmers, slaughterhouse workers, etc who work closely with animals. The disease which is passed to man from infected cattle, goats, and hogs is also known as undulant fever, Mediterranean fever, and Malta fever. It takes its name from three closely related organisms of the Brucella group of bacteria. In animals, the disease can cause spontaneous abortions, most notably in cattle. The infection tends to localize in the udders and cause contamination of the milk. Humans can contract the disease by direct contact with infected animals or by drinking contaminated milk. Prevention involves isolation of infected animals and pasteurizing milk.

The incubation period ranges from as little as five days to as long as three weeks in man. A victim may experience a sudden onset or a gradual development of symptoms. The patient may suffer from aching joints and heavy sweating as well as weakness and a lingering fever which comes and goes over long periods of time. Most victims also experience diminished appetite and weight loss. Women may undergo disruption of their menstrual cycle, and some patients may have uncontrolled trembling in their tongue and fingers and feel irritable and depressed. Complications could affect the testicles, the nervous system, and the valves of heart in severe cases.

Most patients recover in three to six months time with antibiotic therapy and ample bed rest.

15. This passage might be found in a report titled
 (A) occupational hazards of the livestock industry
 (B) the risks of practicing veterinary medicine
 (C) viral diseases in man and animals
 (D) bacterial afflictions of man and animal

16. According to the passage, the time it takes for an exposed person to show symptoms is
 (A) rarely more than five days
 (B) rarely less than three weeks
 (C) three weeks or less
 (D) the incubation period

17. The disease can be passed to humans by
 (A) drinking pasteurized milk
 (B) drinking milk from uninfected animals
 (C) touching the udders of infected animals
 (D) eating untreated goose liver

18. What is the best way to avoid catching the disease?
 (A) Become a vegetarian.
 (B) Don't drink milk.
 (C) Practice hibernation.
 (D) Follow prescribed prophylaxis.

19. In line 12, the word "undergo" could best be replaced by
 (A) undertake
 (B) forego
 (C) experience
 (D) relate

20. In line 4, the word "it" refers to
 (A) Malta fever
 (B) Undulant fever
 (C) Mediterranean fever
 (D) Brucellosis

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The Galapagos Islands are in the Pacific Ocean, off the western coast of South America. They are a rocky, lonely spot, but they are also one of the most unusual places in the world. One reason is that they are the home of some of the last giant tortoises left on earth.

Weighing hundreds of pounds, these tortoises, or land turtles, wander slowly around the rocks and sand of the islands. Strangely, each of these islands has its own particular kinds of tortoises. There are seven different kinds of tortoises on the eight islands, each kind being slightly different from the other. Hundreds of years ago, thousands of tortoises wandered around these islands. However, all that changed when people started landing there. When people first arrived in 1535, their ships had no refrigerators. This meant that fresh food was always a problem for the sailors on board. The giant tortoises provided a solution to this problem.

Ships would anchor off the islands, and crews would row ashore and seize as many tortoises as they could. Once the animals were aboard the ship, the sailors would roll the tortoises onto their backs. The tortoises were completely helpless once on their backs, so they could only lie there until used for soups and stews. Almost 100,000 tortoises were carried off in this way. The tortoises faced other problems, too. Soon after the first ships, settlers arrived bringing pigs, goats, donkeys, dogs and cats. All of these animals ruined life for the tortoises. Donkey and goats ate all the plants that the tortoises usually fed on, while the pigs, dogs and cats consumed thousands of baby tortoises each year. Within a few years, it was hard to find any tortoise eggs-or even any baby tortoises.

By the early 1900s, people began to worry that the last of the tortoises would soon die out. No one, however, seemed to care enough to do anything about the problem. More and more tortoises disappeared, even though sailors no longer needed them for food. For another fifty years, this situation continued. Finally, in the 1950s, a scientist decided that something must be done.

The first part of their plan was to get rid of as many cats, dogs and other animals as they could. Next, they tried to make sure that more baby tortoises would be born. To do this, they started looking for wild tortoise eggs. They gathered the eggs and put them in safe containers. When the eggs hatched, the scientists raised the tortoises in special pens. Both the eggs and tortoises were numbered so that the scientists knew exactly which kinds of tortoises they had-and which island they came from. Once the tortoises were old enough and big enough to take care of themselves, the scientists took them back to their islands and set them loose. This slow, hard work continues today, and, thanks to it, the number of tortoises is now increasing every year. Perhaps these wonderful animals will not disappear after all.

21. What happened first?

- (A) The tortoise meat was used for soups and stews
- (B) Tortoises were put onto their backs.
- (C) Settlers brought other animals to the islands.
- (D) Pigs had been all the sailors had to eat.

22. What happened soon after people brought animals to the islands?

- (A) Tortoise eggs were kept in safe containers
- (B) Scientists took away as many animals as they could.
- (C) The animals ate the tortoises' food and eggs.
- (D) The tortoises fought with the other animals.

23. When did people start to do something to save the tortoises?

- (A) in the early 1900s
- (B) in the 1400s
- (C) in the 1500s
- (D) in the 1950s

24. What happens right after the tortoise eggs hatch?

- (A) The scientist raised the tortoises in special pens.
- (B) The scientists take the tortoises back to their islands.
- (C) The scientists get rid of cats, dogs, and other animals.
- (D) The scientist encouraged the villagers to help.

25. What happened last?

- (A) The tortoises began to disappear.
- (B) The number of tortoises began to grow.
- (C) Scientists took away other animals.
- (D) Tortoises were taken back to their home islands.

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第二部分 翻譯測驗(英翻中) 請翻譯下列全文(若無適當專有名詞者則用原文表示) 50分

Bioinformatics or computational biology is the use of mathematical and informational techniques, including statistics, to solve biological problems, usually by creating or using computer programs, mathematical models or both. One of the main areas of bioinformatics is the data mining and analysis of the data gathered by the various genome projects. Other areas are sequence alignment, protein structure prediction, systems biology, protein-protein interactions and virtual evolution. As a summary, the various genome projects produce many long lists of letters and one of the roles of bioinformatics is to attempt to determine the meaning (functional significance) of those letters. There are many who hope that developments in this field will ultimately help in the discoveries of cures for various diseases including cancer.

Systems biology involves the use of computer simulations of cellular subsystems (such as the networks of metabolites and enzymes which comprise metabolism, signal transduction pathways and gene regulatory networks) to both analyze and visualize the complex connections of these cellular processes.

Systems biology is an academic field that seeks to integrate biological data as an attempt to understand how biological systems function. By studying the relationships and interactions between various parts of a biological system (e.g. organelles, cells, physiological systems, organisms etc.) it is hoped that an understandable model of the whole system can be developed. Some scientists have called systems biology "interactomics", in analogy with other -omics such as genomics and proteomics, but this term is not widely used.

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I. 解釋名詞 (20%)

- (1) Hydropathy index;
- (2) Chemiosmotic coupling;
- (3) Z DNA;
- (4) Abzyme;
- (5) Lectin;
- (6) Ubiquitin;
- (7) MALDI-TOF mass spectrometry ;
- (8) Cumulative feedback inhibition ;
- (9) Ferredoxin ;
- (10) Pulsed-field electrophoresis.

II. 得知 protein 一次結構的 sequence，我們能做些甚麼事。(10%)

III. Chymotrypsin 之催化 mechanism 中有所謂之 catalytic triad，就現代生化研究技術中如何證明之。(10%)

IV. 何謂 β -oxidation？與 glucose 之 oxidation 同為能量之生成，但在生理生化上有何差異。(10%)

V. 請依範例完成下表 (10%)

Vitamin	Coenzyme	Typical reaction type	Consequences of deficiency
B1 (範例)	Thiamine pyrophosphate	Aldehyde transfer	Beriberi
B6			
Folic acid			
C			
Biotin			

VI. Please describe the mechanism why Fluorouracil, the analog of dUMP, can use to treatment cancer. (10%)

VII. Reactive oxygen species (ROS) generated in oxidative metabolism can ultimately lead to cell death. Please describe the mechanism that cell protect itself against ROS? (10%)

VIII. Please describe why a heavy drinker more easy to have "fatty liver". (10%)

IX. Please write the names of six major classes of enzyme. (10%)

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一、 單選題 (每題 2 分，共 30 題，答題時請標明題號，答案請以大寫 ABCDE 標註清晰)

1. The role of the Dam methylase is to:

- (A) label (methylate) the template strand for recognition by repair systems
- (B) replace a mismatched nucleotide with the correct one
- (C) remove a mismatched nucleotide from the template strand
- (D) remove a methyl group from thymine

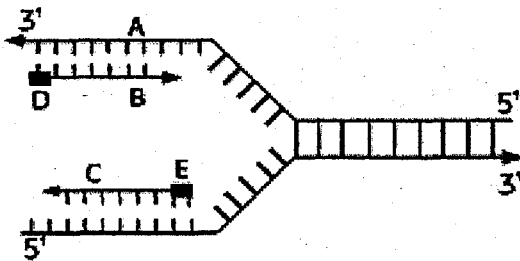
2. Which of following statement is **INCORRECT**?

- (A) Crick and Brenner revealed that the genetic code is built of triplet codons
- (B) Crick and Watson devised the wobble concept
- (C) Crick referred the flow of genetic information as the central dogma
- (D) Crick and Watson found the double helix structure of DNA

3. In double-strand DNA:

- (A) Sequence rich in A-T base pairs are denatured less readily than those rich in G-C pairs
- (B) The structure is compatible only with a right-handed (never a left-handed) helix
- (C) The two strands have complementary sequences
- (D) The sequence of bases has no effect on the overall structure

4. In this diagram of DNA replication process at a replication fork, the strand labeled B is



- (A) leading strand
- (B) lagging strand
- (C) Okazaki fragment
- (D) Both of (B) and (C)

5. In this diagram above, D and E are referred to :

- (A) DNA primer
- (B) RNA primer
- (C) Replicator
- (D) replicon

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6. Which term has been suggested for the core of 8 histone molecules with DNA wrapped around the outside and one molecule of histone H1?
- (A) Chromosome
 - (B) Chromatin
 - (C) nucleosome
 - (D) nucleosome complex
7. Segments of the genome that can move from one place to another are known as
- (A) transposable genetic elements.
 - (B) jumping genes.
 - (C) Transposon
 - (D) all of the above
8. Which of the following statements regarding plasmid cloning vectors is **FALSE**?
- (A) they are small, circular DNAs
 - (B) foreign DNA fragments up to 45000 base pairs can be cloned in a typical plasmid
 - (C) plasmids often contain genes that confer resistance to antibiotics
 - (D) an origin of replication must be included in a plasmid to allow it to be propagated in *E. coli*
9. "Housekeeping genes" in bacteria are commonly expressed constitutively, but not all of these genes are expressed at the same level (the same number of molecules per cell). What is the primary mechanism responsible for variations in the level of constitutive enzymes?
- (A) All constitutive enzymes are synthesized at exactly the same rate, but some are degraded faster than others.
 - (B) Some constitutively expressed genes are more inducible than others.
 - (C) Some constitutively expressed genes are more repressible than others.
 - (D) Different genes have slightly different promoters, with different affinities for RNA polymerase holoenzyme.
 - (E) The same number of mRNA copies are made from each gene, but these mRNAs are translated at different rate.
10. Which of the following statements about aminoacyl-tRNA synthetases is **FALSE**?
- (A) There is a different synthetase for every amino acid
 - (B) The enzyme attaches an amino acid to the 3' end of a tRNA.
 - (C) The enzyme will use any tRNA species, but is highly specific for a given amino acid.
 - (D) Some of the enzymes have an editing / proofreading capacity.

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11. Which of the following statements about mRNA stability is true?
- (A) In general, bacterial mRNAs have longer half-lives than do eukaryotic mRNAs
 - (B) Secondary structure in mRNA (hairpins, for example) slows the rate of degradation
 - (C) The rate of mRNA degradation is always at least 10-fold slower than the rate of synthesis
 - (D) mRNA degraded by nucleotide phosphorylase produces 5'-nucleoside monophosphate
12. Aminoacyl-tRNA synthetases (amino acid activating enzymes):
- (A) "recognize" specific tRNA molecules and specific amino acids.
 - (B) interact directly with free ribosomes.
 - (C) in conjunction with another enzyme attach the amino acid to the tRNA.
 - (D) have all the properties listed above.
13. Which of the following statements is true of the attenuation mechanism used to regulate the tryptophan biosynthetic operon in *E. coli*?
- (A) One of the enzymes in the Trp biosynthetic pathway binds to the mRNA and blocks translation when tryptophan levels are high.
 - (B) Attenuation is the only mechanism used to regulate the trp operon.
 - (C) Trp codons in a leader peptide gene allow the system to be sensitive to tryptophan levels in the cell.
 - (D) When tryptophan levels are low, the trp operon transcripts are attenuated before the operon's structural genes are transcribed.
14. In the laboratory, recombinant plasmids are commonly introduced into bacterial cells by:
- (A) microinjection
 - (B) transformation: temperature shock of cells incubated with plasmid in the presence of CaCl_2
 - (C) infection with *Agrobacterium* that carries the plasmid
 - (D) mixing plasmids with an extract of broken cells
 - (E) none of the above methods
15. Which scientists first gave experimental evidence that DNA is the genetic material?
- (A) Avery, MacLeod, and McCarty who repeated the transformation experiments and chemically characterized the transforming principle.
 - (B) Garrod, who postulated that black urine disease, was due to a defective enzyme.
 - (C) Beadle and Tatum, who used a mutational and biochemical analysis of the bread mold *Neurospora* to establish a direct link between genes and enzymes.
 - (D) Meselson and Stahl who showed that DNA is replicated semiconservatively

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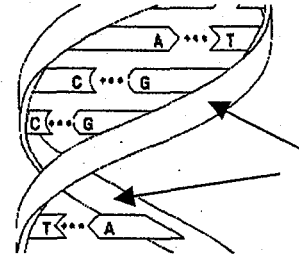
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16. In the figure to the right, the "A" stands for _____, which is a _____. The outside bands (arrows) are _____. The dots represent _____ bonds.

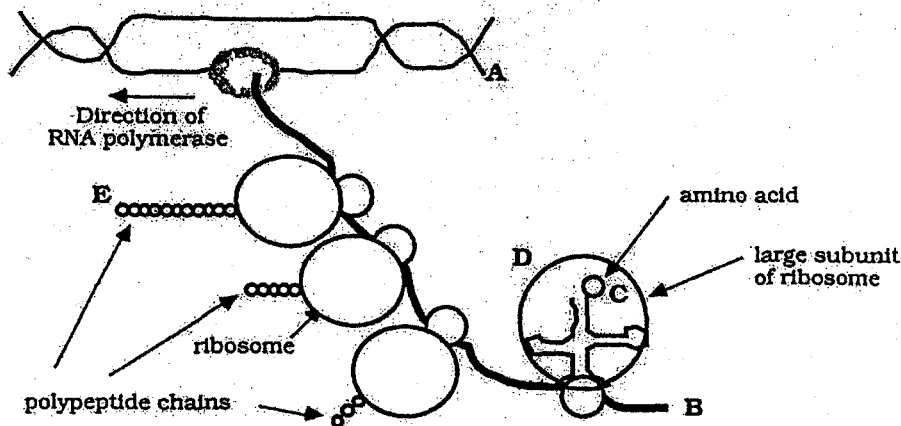


- A. adenine, purine, amino acids, ionic
- B. adenine, purine, phosphate/sugar, hydrogen
- C. adenosine, pyrimidine, carbohydrate, ionic
- D. adenine, purine, phosphate/sugar, phosphodiester
- E. adenosine, pyrimidine, carbohydrate, hydrogen

17. When considering the nature of genetic regulation in eukaryotes, one often comes across the term "**housekeeping genes**". We could expect that such housekeeping genes would

- A. provide mRNAs which are not protected at their 5' and/or 3' ends
- B. code for proteins which are found only in certain cell types
- C. be active only in heart and liver cells because they are the most vital cells in an organism
- D. provide hnRNAs which do not undergo intron removal
- E. code for proteins which are essential for all cells of an organism

18. Below is a drawing which represents simultaneous transcription and translation in *E. coli*. Supply the correct response for the two questions provided below. The direction of the RNA polymerase is given by the arrow.



The letter A is nearest the 5' or 3' end of the molecule?

The letter B is nearest the 5' or 3' end of the molecule?

Which terminus (N or C) of the growing polypeptide chain is nearest the letter E

- A. 3', 5', N, respectively
- B. 5', 3', N, respectively
- C. 5', 5', N, respectively
- D. 5', 3', C, respectively
- E. 3', 5', C, respectively

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19. In the diagram for the previous question, which of the following is correct?
- The three polypeptide chains being made are going to be different structurally and functionally.
 - The anticodon-codon relationship should be characterized as parallel and anti-complementary.
 - The anticodon-codon relationship should be characterized as parallel and complementary
 - The ribosomes are moving up
 - The ribosomes are moving down
20. Which of the following statements of Trp operon is correct?
- Trp RNA-binding attenuation protein (TRAP) is a regulatory protein of *E. coli* tryptophan biosynthesis
 - Trp RNA-binding attenuation protein (TRAP) is a 11 subunits protein and binds to DNA when the tryptophan is abundance
 - The terminator structure formed when tryptophan starvation in the *E. coli* cell
 - The trp operon regulation is the same way in *E. coli* and *B. subtilis*
 - The trp operon of *B. subtilis* is turned off when TRAP binds to the target sequence
21. Given that there are three "termination codons" which do not code for a given amino acid, one would expect that there would be 61 tRNAs. However, the actual number is smaller (about 45), because
- some tRNAs have anticodons that can recognize two or more different codons.
 - many tRNAs are often degraded during isolation and purification
 - the code is universal
 - AUG is the starting triplet only in prokaryotes
 - the base sequence and three dimensional structure for any given tRNA species varies sufficiently to allow for ambiguous codon recognition
22. Given below is a hypothetical "wild type" polypeptide containing twelve amino acids (each letter arbitrarily represents one amino acid). Assume that gene *X* is responsible for its synthesis.
A-B-C-D-E-F-G-H-I-J-K-L
 The amino acid "A" is at the C terminus and amino acid "L" is at the N terminus of this polypeptide. Assume that a frameshift mutation results in an insertion of a base between the 9th and 10th positions of the coding region of the mRNA (counting from the 5' end of the coding region of the mRNA). What would be an expected amino acid sequence under this hypothetical condition?
- O-S-E-Y-I-U-T-S-R-J-K-L
 - Z-Y-X-D-E-F-G-H-I-J-K-L
 - A-B-C-X-T-Y-O-H-O-P-W-D
 - A-B-C-D-E-F-G-H-I-O-U-R
 - A-B-C-D-E-F-G-H-I-

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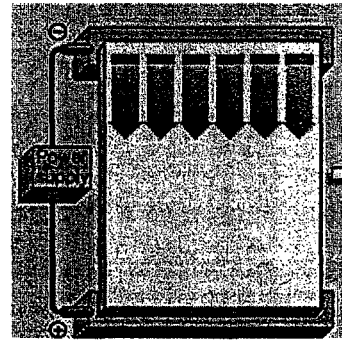
本科原始成績滿分 100 分

23. Some scientists think that RNA may have served as the genetic material in the first life forms. This theory became popular after it was discovered that some RNA molecules

- _____.
- A. form peptides in nature
- B. possess some enzymatic activities
- C. contain the base thymine
- D. can form polyproteins
- E. can form phospholipids

24. The apparatus to the right would be used in the process of

_____ to _____
molecules on the basis of their _____.



- A. centrifugation, separate, radioactivity
- B. centrifugation, separate, size and shape
- C. electrophoresis, separate, size and charge
- D. electrophoresis, radioactively label, permeability
- E. electrophoresis, precipitate, size and shape

25. Although the expression of most genes is tightly regulated, some genes are expressed at roughly constant rates (*i.e.* constitutively). Which of the following genes would you predict to be constitutively expressed?

- A. Genes involved in the biosynthesis of tryptophan (an amino acid)
- B. Genes involved in the degradation of tryptophan
- C. Genes involved in the degradation of arabinose, a sugar
- D. Genes that code for ribosomal RNAs
- E. Genes involved in the transport of maltose, a sugar, into the cell

26. Imagine you isolate two different mutant colonies of *E. coli* that remain white when grown on a medium containing X-Gal and IPTG. You name these mutant *A* and mutant *B*. Separate cultures of these mutants are grown, the cells are harvested (collected), and lysed (broken open). X-Gal is added to lysed cells (lysates) of each culture. The lysate of mutant *A* develops blue color; the lysate of mutant *B* does not. What can you make of this?

- A. Mutant *A* has a mutation in the *lacZ* (β -galactosidase) gene; mutant *B* has a mutation in the *lacY* (permease) gene
- B. Mutant *A* has a mutation in the *lacY* gene; mutant *B* has a mutation in the *lacZ* gene
- C. Mutant *A* has a mutation in the *lacZ* gene; mutant *B* has a mutation in the *lacI* gene
- D. Mutant *A* has a mutation only in the *lacI* gene; mutant *B* has a mutation in the *lacY* gene
- E. Answers A and D are correct.

國立高雄大學九十四學年度研究所碩士班招生考試試題

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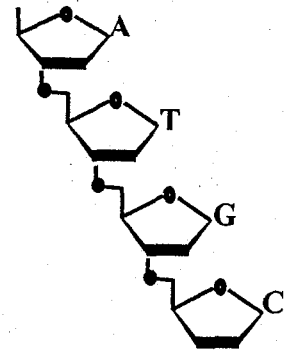
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27. To begin the hunt for the human growth hormone gene, researchers created a cDNA library from cells in the pituitary gland. What did this library contain?
- mRNA containing only the growth hormone sequence
 - DNA versions of the mRNAs in the pituitary-gland cells
 - all of the coding sequences in the human genome, but no introns
 - all of the coding sequences in the human genome, including introns
 - all the introns in the human genome
28. What are the functions of ammonium persulfate (APS), TEMED and SDS used in polyacrylamide gel electrophoresis?
- catalyst, initiator, dye
 - catalyst, initiator, change the protein charge
 - initiator, catalyst, break the disulfide bond
 - initiator, catalyst, change the protein charge
 - catalyst, initiator, break the disulfide bond

29. Suppose that the tetranucleotide to the right was synthesized with a ^{32}P labeling the innermost phosphate of GTP. Assume also that the molecule was cleaved with the enzyme spleen diesterase which breaks the covalent bond connecting the phosphate to C-5'. After such cleavage

- the ^{32}P would be attached to the 3' carbon of the deoxyadenine.
- the ^{32}P would be attached to the 3' carbon of the deoxycytosine.
- the ^{32}P would be attached to the 5' carbon of the deoxycytosine.
- the ^{32}P would be attached to the 3' carbon of the deoxythymine.
- the ^{32}P would be attached to the 5' carbon of the deoxythymine.



30. If the coding DNA is 5'-GATTACTA-3', the mRNA sequence is?
- 5'-GAUUACUA-3'
 - 5'-CUAAUCAU-3'
 - 5'-TAGTAATC-3'
 - 5'-ATCATTAG-3'
 - 5'-UAGUAAUG-3'

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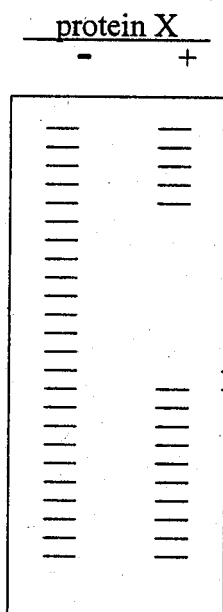
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二、問答題

1. Please describe those three kinds of splicing mechanisms (10 分)
2. What is tmRNA? And, what is its function? (5 分)
3. The DNA molecule below is believed to contain a binding site for protein X. It is labeled at the 5' end of the top strand (*), then subjected to a footprinting experiment. In the idealized gel below, there is a band for every base of the labeled strand. On the DNA sequence, point out the binding site for protein X. (5 分)



Sequence : *(5') GGATT CTAATAAAGT CG TCACGTA(3')
 CC TAAGATTAT T TCAGC AGTGCAT

4. What is difference between following terms? (10 分)
 - (1) intron ; intein
 - (2) Okazaki fragment ; Klenow fragment
 - (3) DNA polymerase ; RNA polymerase
 - (4) SNP (single-nucleotide polymorphism) ;
RFLP (restriction fragment length polymorphism)
 - (5) T-DNA ; Z-DNA
5. (1) Briefly describe the dideoxy sequencing procedure. Why is it limited to sequence of about 500 bp? (5 分)
- (2) What is the difference between Shotgun Sequencing and conventional sequencing strategy? What is the difference between Directed Shotgun Assembly and Clone Contig Assembly? What is the major similarity between the two Assembly procedures? (5 分)