



國立臺灣海洋大學 100 學年度博士班招生考試試題

考試科目：水產養殖學綜論

系所名稱：水產養殖學系博士班

1. 單選題，每題 1 分，共 100 分（答錯不倒扣）
2. 請依題號順序，將答案填入答案卷

- () 1. What happens when a neuron's membrane depolarizes?
(A) There is a net diffusion of Na^+ out of the cell.
(B) The magnitude of the neuron's membrane voltage is reduced.
(C) The equilibrium potential for K^+ (E_k) becomes more positive.
(D) The inside of the cell becomes more negative relative to the outside.
- () 2. Which of the following is a direct result of depolarizing the presynaptic membrane of an axon terminal?
(A) Voltage-gated Ca^{+2} channels in the membrane open.
(B) Synaptic vesicles fuse with the membrane.
(C) The postsynaptic cell produces an action potential.
(D) Ligand-gated channels open, allowing neurotransmitters to enter the synaptic cleft.
- () 3. Which lake zone would be absent in a very shallow lake?
(A) benthic zone (B) aphotic zone (C) pelagic zone (D) littoral zone
- () 4. Which of these ecosystems has the lowest net primary production per square meter?
(A) a salt marsh (B) an open ocean (C) a coral reef (D) a grassland
- () 5. 下列哪一種不是蝦類的必需胺基酸？
(A) Arginine (B) Alanine (C) Valine (D) Lysine
- () 6. 下列何者與甲殼類代謝醣類有直接關係？
(A) Molt-inhibiting hormone(MIH) (B) Molt hormone hormone(MH)
(C) Hyperglycemic hormone(HH) (D) 以上皆有關
- () 7. 蝦類心臟有幾對開口？
(A) 1 對 (B) 2 對 (C) 3 對 (D) 4 對
- () 8. 甲殼類的血球細胞中，哪一種不具吞噬作用？
(A) 白血球 (B) 大顆粒血球 (C) 小顆粒血球 (D) 無顆粒血球
- () 9. If a solution of lysin, valine and aspartate at pH2 were loaded on a strong cation exchange column and eluted from the column with a gradient of increasing pH, what would be the order (first to last) in which these amino acids would elute from the column?
(A) val, lys, asp (B) lys, val, asp (C) asp, val, lys (D) asp, lys val
- () 10. Determine the amino acid sequence of the following oligopeptide from the experimental data below.
i) The amino acid composition is found to be [ala, lys, phe, met, cys, plus some decomposition products].
ii) The peptide has a molecular weight around 700 Da and absorbs at 280 nm.
iii) Treatment with carboxypeptidase results in tryptophan and a peptide.
iv) CNBr treatment yields a tetrapeptide and a dipeptide.
v) Trypsin digestion produces an amino acid and a pentapeptide with met on the amino acid.



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- vi) Chymotripsin digestion yields a dipeptide and a tetrapeptide.
- (A) trp-lys-met-cys-met-ala (B) lys-met-cys-phe-ala-trp
(C) trp-ala-phe-cys-met-lys (D) lys-ala-cys-phe-met-trp
- () 11. Insulin is a polypeptide hormone that contains two short polypeptide chains linked by two interstrand disulfide bonds. The most logical order of events to perform in order to sequence this protein would be
- a) The peptides are reduced with mercaptoethanol.
 - b) The peptides are sequenced using Edman chemistry.
 - c) The peptides are separated by chromatography techniques.
 - d) The peptides are alkylated with iodoacetamide.
- (A) a, d, c, b (B) c, a, d, b (C) c, b, a, d (D) a, b, c, d
- () 12. In the urea cycle, the molecule which is synthesized in the cytoplasm and transported to the mitochondrial matrix for subsequent reaction is
- (A) citrulline (B) ornithine (C) argininosuccinate (D) aspartate
- () 13. Intramolecular rearrangement, such as observed in the conversion of mammalian methylmalonyl-CoA to succinyl-CoA, requires the coenzyme
- (A) folic acid (B) biotin
(C) flavin (D) a coenzyme derived from cyanocobalamin
- () 14. How are fatty acids primarily exported from the liver?
- (A) as free fatty acids
(B) as triglyceride in the core of the lipoprotein LDL
(C) as triglyceride in the core of the lipoprotein VLDL
(D) as triglyceride in the core of chylomicrons
- () 15. All of the following are characteristics of arachidonic acid except
- (A) It contains four double bonds, all of which are cis.
(B) It is a precursor for leukotrienes and most prostaglandins
(C) It can be formed from stearic acid in eukaryotes
(D) E.coli is unable to synthesize this polyunsaturated fatty acid
- () 16. The complete oxidation of which organic fuel produces the greatest energy in metabolic reactions per gram in the cell
- (A) protein (B) triacylglycerols (C) carbohydrates (D) maltose
- () 17. 威脅多種養殖魚類之甲殼類寄生蟲，身體扁平、具兩對 antennae 及吸盤者為
- (A) *Argulus* sp. (B) *Ichthyophthirius* sp. (C) *Trichodina* sp. (D) *Glugea* sp.
- () 18. 以下何者為寄生在魚皮膚、鰭、鰓等部位之胎生寄生蟲
- (A) *Gyrodactylus* sp. (B) *Benedenia* sp. (C) *Glugea* sp. (D) *Lernaea* sp.
- () 19. 以下何種寄生蟲寄生於骨骼系統



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(A) *Pleistophora* sp. (B) *Ichthyobodo necatrix* (C) *Kudoa* sp. (D) *Myxosoma cerebrali*

- () 20. 以下寄生蟲何者有馬蹄型大核的型態(horse-shoe-shaped macronucleus)，鏡檢時容易判別
(A) *Amyloodinium* sp. (B) *Ichthyophthirius* sp. (C) *Myxobolus* sp. (D) *Costia* sp.
- () 21. 感染白蝦的桃拉病毒屬於以下哪一病毒科
(A) *Parvoviridae* (B) *Picornaviridae* (C) *Baculoviridae* (D) *Nodaviridae*
- () 22. 以下病毒何者不曾在臺灣被發現
(A) IPNV (B) LDV (C) VHSV (D) WSSV
- () 23. 引起鮭魚嚴重出血、水腫等病變、為美國地區重要的暖水魚病毒病的病原體為
(A) VHSV (B) CCV (C) LDV (D) NNV
- () 24. 自 1950 年以來，在中國大陸引起草魚出血症並造成重大經濟損失的病原為
(A) Orthomyxovirus (B) Nodavirus (C) Aquareovirus (D) Aquabirnavirus
- If the rate constant for the enzyme catalyzed reaction is 2×10^5 /sec and the rate constant
() 25. for the uncatalyzed reaction is 2×10^{-6} /sec, the catalytic power of the enzyme is:
(A) 10^{11} (B) 2×10^{-11} (C) 10^{-11} (D) 10^{-1}
- () 26. The catalytically active complex of _____ and _____ group is called the _____.
(A) apoenzyme; holoenzyme; prosthetic (B) prosthetic; holoenzyme; apoenzyme
(C) holoenzyme; prosthetic; apoenzyme (D) apoenzyme; prosthetic; holoenzyme
- () 27. Enzymes have active sites which have the greatest complementarity to the:
(A) substrate. (B) transition state. (C) product. (D) both substrate and product.
- () 28. Ketone bodies are synthesized in the:
(A) cytosol of muscle. (B) mitochondria of liver.
(C) endoplasmic reticulum of heart. (D) plasma membrane of brain.
- () 29. What are the final products of aerobic catabolism?
(A) pyruvate and H_2O . (B) acetyl-CoA and CO_2 .
(C) CO_2 and H_2O . (D) pyruvate and acetyl-CoA.
- () 30. Many of the catabolic pathways converge to the common two-carbon intermediate:
(A) alanine. (B) acetyl group of acetyl-CoA. (C) lactic acid. (D) glucose.
- () 31. Dehydrogenases are enzymes that:
(A) move hydrogens within the molecule.
(B) add hydrogens across double bonds.
(C) transfer hydrogens between substrates.
(D) transfer hydride ions to NAD^+ (or $NADP^+$) and release a proton.
- () 32. Gluconeogenesis is the synthesis of:
(A) glucose from non-carbohydrate precursors. (B) glycogen from glucose.



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(C) pyruvate from glucose.

(D) fatty acids from glucose.

- () 33. GnRH 會促進魚類何種激素分泌？
(A) TSH (B) LH (C) GH (D) ACTH
- () 34. 下列哪種物質與卵巢的發育較為相關？
(A) aromatase (B) monoamine oxidase
(C) steroid dehydroxylase (D) carbonic anhydrase
- () 35. 下列何者與魚類的緊迫 (stress) 有直接性的關係？
(A) prolactin (B) CRH (C) dopamine (D) serotonin
- () 36. 下列與魚類卵細胞成熟最有相關之激素？
(A) estrogen (B) prostaglandin
(C) LH (D) 17, 20 β -dihydroxy-4-pregnen-3-one
- () 37. 魚類 gill lamellae 血液與水之流向形成
(A) cross-current (B) co-current
(C) counter-current (D) uniform pool
- () 38. 除了 gill 外，魚類哪些器官對滲透壓調控扮演重要之角色？
(A) intestine (B) liver (C) swimbladder (D) pituitary
- () 39. 與季節活動及光照周期較相關之腺體為
(A) gonad (B) brain (C) pineal gland (D) pituitary
- () 40. steroid 之作用機制主要是經由
(A) cyclic AMP (B) IP3 (C) gene activation (D) Ca⁺⁺ 之途徑
- () 41. Albinism in humans is caused by a recessive allele. A normal couple have 4 children - 3 normal and 1 albino. What are the genotypes of the parents?
(A) only one parent carries the albino allele
(B) one parent is purebred for albinism and the other parent is hybrid
(C) both hybrid for albinism
(D) both parents are normal
- () 42. In chickens, black eye colour is dominant to blue eye colour. If a purebred black-eyed rooster mated with a purebred blue-eyed hen, what is most likely for the next generation's eye colour characteristics?
(A) all blue-eyed (B) all black-eyed
(C) 1 blue-eyed:1 black-eyed (D) insufficient information given
- () 43. The man considered the father of modern genetics, who also determined how genes are inherited is:
(A) Charles Darwin (B) Louis Pasteur
(C) Isaac Newton (D) Gregor Mendel



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- () 44. A young woman of northern European descent is the single parent of a child with autosomal recessive cystic fibrosis (CF). She marries a genetically unrelated man of northern European descent and wishes to have more children. What is the risk that he is a carrier of CF? Assume the frequency of CF is 1/2500 in this population.
(A) 1/2500 (B) 1/1250 (C) 1/50 (D) 1/25
- () 45. Which species has “not” been widely used in breeding program?
(A) Tilapia (B) Salmon (C) Catfish (D) Tuna
- () 46. Which example is not a genotype?
(A) C/c (B) brown eyes/black eyes
(C) T/G (SNP genotyping) (D) 1/0 (RFLP genotyping)
- () 47. How many chromosomes are contained in one egg or one sperm?
(A) 22 (B) 23 (C) 44 (D) 46
- () 48. Typically, strains which are selectively bred are _____, and the breeding is sometimes done by a professional breeder.
(A) Domestication (B) Cattle (C) Hybrid (biology) (D) Livestock
- () 49. Primary productivity means
(A) zooplankton production (B) fish production
(C) phytoplankton production (D) turtle production.
- () 50. The origin of acid-sulfate soil is
(A) H_2SO_4 (B) FeS (C) FeS_2 (D) $Fe(OH)_3$.
- () 51. When nitrate and ammonia are utilized by phytoplankton. The process is called
(A) nitrogen fixation (B) assimilation (C) mineralization (D) dissimilation
- () 52. Common parameters to express organic substances is
(A) alkalinity (B) hardness (C) total particulate organic matter (D) pH
- () 53. The total concentration of cations equals to the concentration of anions in water in
(A) % (B) mg/l (C) meq/l (D) mmol/l
- () 54. Macrophyte is
(A) Producer (B) Consumer (C) Decomposer (D) Player
- () 55. The immune tools used to evaluate the immune response of decapod crustaceans is
(A) oxygen consumption and total haemocyte count
(B) ammonia excretion and oxygen consumption
(C) phenoloxidase activity and respiratory burst
(D) phenoloxidase activity and ammonia-N excretion
- () 56. Off-flavor (earthy-musty flavor) in fish is caused by the adsorption of objectionable flavor compounds by the fish from the environment. Earthy-musty in fish is commonly associated with



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(A)green algae (B)blue-green algae (C)flagellate (D)diatom

- () 57. Pit plugs are the distinct structures between the cells of:
(A) Chlorophyta, (B) Cyanophyta, (C) Rhodophyta, (D) Chromophyta.
- () 58. Phycobiliprotein are the photosynthetic pigments of:
(A) Chlorophyta, (B) Cyanophyta, (C) Chromophyta, (D) Haptophyta.
- () 59. The algal colonies in which the number of cells is fixed and no further added. These colonies are named:
(A) coccoid, (B) thalli, (C) coenobium, (D) coenocyte.
- () 60. Evidence for an endosymbiotic origin for chloroplast includes the following:
(A) circular DNA (B) ribosome of 70S (C) DNA lack histone (D) all are correct.
- () 61. How to distinguish alga from other plant:
(A) morphology, (B) reproductive structure, (C) pigments, (D) DNA sequence.
- () 62. Which is the most advanced group?
(A) Prasinophyceae, (B) Chlorophyceae, (C) Ulvophyceae, (D) Charophyceae.
- () 63. Where is nitrogen fixed in blue-green alga?
(A) hormogonium, (B) heterocyst, (C) akinete, (D) trichome.
- () 64. Cocoliths are calcified scales of:
(A) Haptophytes (B) Dinoflagellates, (C) Cryptomonads, (D) Euglenophytes.
- () 65. Temporary members of the plankton, who often live loosely associated with substrates:
(A) euplanktonic, (B) periphytic, (C) meroplanktonic (D) all correct.
- () 66. 點帶石斑魚在分類上屬於哪一綱 (class) ?
(A) Actinopterygii (B) Chondrichthyes
(C) Myxini (D) Sarcopterygii
- () 67. 點帶石斑魚在分類上屬於哪一目 (order) ?
(A) Cypriniformes (B) Lophiiformes
(C) Perciformes (D) Siluriformes
- () 68. 點帶石斑魚在分類上屬於哪一科 (family) ?
(A) Clariidae (B) Istiophoridae
(C) Muraenidae (D) Serranidae
- () 69. 俗稱烏魚的鰻，在分類上屬於哪一綱 (class) ?
(A) Actinopterygii (B) Chondrichthyes
(C) Myxini (D) Sarcopterygii
- () 70. 俗稱烏魚的鰻，在分類上屬於哪一目 (order) ?
(A) Cypriniformes (B) Lophiiformes



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- (C) Mugiliformes (D) Perciformes
- () 71. 俗稱烏魚的鰻，在分類上屬於哪一科 (family) ?
(A) Diodontidae (B) Mugilidae
(C) Sparidae (D) Syngnathidae
- () 72. 俗稱烏魚的鰻，其學名為？
(A) *Liza macrolepis* (B) *Mugil cephalus*
(C) *Pagrus major* (D) *Xiphias gladius*
- () 73. 動物完整學名中何部分更動，則需在『命名者姓氏及命名年代』外面加上括號？
(A) 亞種名 (B) 種名 (C) 種小名 (D) 屬名
- () 74. 全球魚類種數最多的目 (order) 為？
(A) Anguilliformes (B) Cypriniformes
(C) Lophiiformes (D) Perciformes
- () 75. A method used to insert or transform cells with a plasmid is to:
(A) add the DNA to bacterial cells that have been lightly treated with lysozyme to produce "holes" in the cell wall
(B) add the DNA to a heated suspension of cells at 42° C
(C) treat the bacteria with Ca^{2+} , add the DNA, and briefly heat to 42° C
(D) incubate the DNA with the cells overnight at 4° C
(E) mixing plasmids with an extract of broken cells
- () 76. The correct sequence of procedures in the Southern blotting (hybridization) technique is:
a) hybridization with radioactive probe
b) agarose gel electrophoresis and visualize bands
c) transfer (blot) to nitrocellulose filter
d) digest DNA with restriction nucleases
e) expose filter to X-ray film, develop and observe
(A) b, a, c, e, d (B) d, c, b, a, e (C) c, d, b, e, a (D) d, b, c, a, e (E) a, b, c, d, e
- () 77. Within the _____ are two consensus sequence elements, the _____ near -10 and a sequence of TATAAT, and the _____ containing the consensus TTGACA.
(A) termination sequence; rho subunit; sigma sub
(B) termination sequence; Pribnow box; sigma subunit unit
(C) promoter sequence; rho subunit; Pribnow box
(D) promoter sequence; Pribnow box; -35 region
(E) promoter sequence; rho subunit; -35 region
- () 78. All are correct statements comparing an intact 4 kb plasmid and a 4 kb fragment of *E. coli* chromosomal DNA. The plasmid has a 50% G+C content and the chromosomal DNA has a 55% G+C content **EXCEPT**:
(A) The T_m of the plasmid would be less than the T_m of the chromosomal DNA



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- (B) The $c_0t_{1/2}$ value (time required to renature 50% of the DNA molecules) of the plasmid would be more than that of the chromosomal DNA
- (C) The plasmid DNA and chromosomal DNA would both show approximately a 30-40% increase in their absorption at 260 nm upon heating to 90° C
- (D) The plasmid DNA would contain more negative supercoiling than the chromosomal DNA fragments
- (E) All are true
- () 79. The genetic code is said to be degenerate, which means that:
- (A) Each codon codes for more than one amino acid
 - (B) An anticodon can interact with more than one codon in the mRNA in which the codon may differ in any or all of the three nucleotides
 - (C) Most amino acids are coded for by more than one codon
 - (D) The code is universally used by virtually all species
 - (E) None are true
- () 80. The appropriate order for the basic steps of protein synthesis are:
- a) The elongation reaction transfers the peptide chain from the peptidyl-tRNA in the P site to the aminoacyl-tRNA in the A site
 - b) The P site is occupied by peptidyl-tRNA carrying the growing polypeptide chain
 - c) Binding of mRNA by the small subunit followed by association of a particular initiator aminoacyl-tRNA that recognizes the first codon
 - d) The large ribosomal subunit joins the initiation complex, preparing it for the elongation stage
 - e) The new, longer peptidyl-tRNA moves from the A site into the P site as the ribosome moves one codon further along the Mrna
- (A) a, c, e, b, d (B) b, e, c, d, a (C) c, d, a, b, e (D) d, c, e, b, a (E) c, d, b, a, e
- () 81. The order of events in the initiation of protein synthesis is:
- a) GTP hydrolysis triggered by the 50 S subunit joining the 30 S subunit releasing IF-1, IF-2 and IF-3
 - b) IF-2 delivers the initiator f-Met-tRNA_i^{fMet} in a GTP-dependent process
 - c) A-site of the 70 S initiation complex is ready to accept an incoming aminoacyl-tRNA
 - d) IF-3 and IF-1 bind 30 S subunit E. mRNA binds to form the 30 S initiation complex
- (A) c, a, e, b, d (B) e, d, a, b, c (C) b, d, c, e, a (D) d, b, e, a, c (E) d, e, a, b, c
- () 82. The correct sequence for homologous recombination steps is:
- a) ligation
 - b) branch migration and strand exchange
 - c) nicking
 - d) EW or NS cleavage, resolution and re-ligation
 - e) strand invasion



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(A) b, c, e, a, d (B) c, b, e, d, a (C) d, c, b, a, e (D) c, e, a, b, d (E) c, a, b, e, d

- () 83. Gnomonic DNA library is:
(A) collection of short fragments from nuclear DNA digestion
(B) arrays of synthetic oligonucleotides used to select for a specific DNA
(C) a set of cloned fragments that collectively represent the genes of a particular organism
(D) a short segment of DNA whose sequence is complementary to a portion of the DNA of interest
(E) a circular DNA molecule of 1 kb to 200 kb found in bacteria and yeast cells
- () 84. 下列何者非目前觀賞水族產業(ornamental fish industry)發展所受到之限制?
(A)動物福利(animal welfare) (B)生態環保
(C)物種多樣性與棲地破壞 (D)關稅限制
- () 85. 下列生物組合何者非互利共生(mutualism)?
(A)水牛與小白鷺 (B)槍蝦(pistol shrimp)與蝦虎(goby)
(C)海葵與小丑魚(clownfish) (D)白背清潔蝦與裸胸鯨
- () 86. 下列何者非觀賞水族生物進行異境運輸時之關鍵技術與主要限制?
(A)溫度變化 (B)飛行航班與載運成本
(C)運輸前之蓄養(stocking)與生物健康狀態 (D)包裝生物種類與對應包裝方式
- () 87. 下列何者非為目前臺灣養殖鮑螺類水生物之主要限制因子?
(A)東北角地區旺盛的水流交換與沿岸流影響
(B)主要伴隨食藻所攜入之大量病原性弧菌(*Vibrio* spp.)
(C)爆發於冬季低水溫期之病毒顆粒
(D)未經妥善親種管理與培育所繁殖出之子代
- () 88. 淡海水觀賞性水生物大規模進行異境運輸可能導致之威脅包括下列幾點，但何者為非
(A)人體健康與公眾衛生 (B)增加物種多樣性(biodiversity)
(C)外來種入侵與族群拓殖 (D)攜帶特定病原並造成相關疾病傳播
- () 89. 下列皆為因受頻繁觀賞水族貿易運輸與相關消費市場明顯偏好所及，而導致野外族群瀕危之物種，但何者為非?
(A)*Pterapogon kauderni* (B)*Hypancistrus zebra*
(C)*Potamotrygon leopoldi* (D)*Pygocentrus nattereri*
- () 90. 下列何者非對於短蝦虎(*Gobiodon* spp.)?
(A)多與特定種類之硬珊瑚共生(symbiosis)
(B)族群數量與共生珊瑚之健康狀態有關
(C)對於寄生性原生動物具低感受性
(D)因為色彩鮮豔故多作為觀賞水族飼養對象
- () 91. 對於生態棲位(niche)下列描述何者為非?
(A)一種物種可兼具多種類之生態棲位以突顯其適應與演化可能



國立臺灣海洋大學 100 學年度博士班招生考試試題

考試科目：水產養殖學綜論

系所名稱：水產養殖學系博士班

1. 單選題，每題 1 分，共 100 分（答錯不倒扣）
2. 請依題號順序，將答案填入答案卷

- (B)在生物性與環境因子間長時間適應與演化所展現
(C)為生物於棲地環境中可利用所有資源之總和
(D)種內或種間個體經常表現持續變動之消長
- ()92. 下列何者非觀賞水族物種主要野生採捕(wild caught)供應來源?
(A)非洲坦干依喀湖(Lake Tanganyika) (B)墨西哥灣
(C)印尼蘇拉威西島(Sulawesi) (D)南美奧利諾科河(Rio Orinoco)
- ()93. 淡水長臂大蝦苗從受精卵剛孵化初第一期，是下列那一期?
(A) Nauplius (B) Zoea (C) Mysis (D) Post-larvae
- ()94. 鰻魚的生活史有幾個明顯的階段:分別為 1. leptocephalus 2. yellow eel 3. silver eel 4. elver 等四個變態期，請下列何項順序為正確變態過程：
(A)1→4→3→2 (B)1→4→2→3 (C)4→1→3→2 (D)4→1→2→3。
- ()95. 魚苗在孵化過程中，常發生卵圓鞭毛蟲感染鰓部，該症常用下列何種藥物處理?
(A)Nalidixic acid (B)Flumequine (C)Mebendazole (D)Copper sulfate。
- ()96. 鰻線鰓內有鰓腺蟲寄生，該症常用下列何種藥物處理?
(A)Nalidixic acid (B)Flumequine (C)Mebendazole (D)Copper sulfate。
- ()97. 下列何種屬於麻醉劑藥物?
(A)Benzocaine (B)Sulfadimethoxine (C)Ormetoprim (D)Tetracycline。
- ()98. 下列何種藥物有 Immuno-stimulants 功能且能殺體表寄生蟲?
(A)Copper (B)Formalin (C)Levamisole (D)Laminaran。
- ()99. 當魚感染鏈球菌時，下列何者我國公告法定藥物可使用抑制或殺死該菌?
(A)Amoxycillin (B)Nalidixic acid (C)Ampicillin (D)Flumequine。
- ()100. 一般魚類麻醉生理分為六期：[1] Light sedation、[2] Deep sedation、[3] Partial loss of equilibrium、[4] Total loss of equilibrium、[5] Loss of reflex reactivity、[6] Medullary collapse。在進行人工催熟時，為降低魚 Stress 而使用麻醉劑，故麻醉生理控制在那一期較佳?
(A)1 或 2 期 (B)5 或 6 期 (C)3 或 4 期 (D)4 或 5 期。