

184/2024

Maximum : 100 marks

Time : 1 hour and 30 minutes

1. In the classical conditioning experiment, conducted originally by Ivan Petrovich Pavlov, a restrained hungry dog is given meat powder (food) in association with the sound of a bell. Choose the correct statement regarding the classical conditioning experiment :
 - (A) Bell is the unconditioned stimulus and food is the conditioned stimulus
 - (B) Bell is the unconditioned stimulus and salivation in response to food is the conditioned response
 - (C) Bell is the conditioned stimulus and food is the unconditioned stimulus
 - (D) Bell is the unconditioned stimulus and salivation in response to food is the unconditioned response

2. DNA barcoding is a promising method to identify organisms. Which is the most commonly used DNA barcode region for identifying animal species?
 - (A) RuBisCO gene
 - (B) 18S rRNA gene
 - (C) Cytochrome B
 - (D) COI

3. In the modern study of organic evolution, the work by Peter R. Grant and Rosemary Grant is especially mentioned, as they reviewed Charles Darwin's observations on the bird species now known as Darwin's Finches. If the number of species of Darwin's Finches on Cocos island is designated as (a) and on the Galápagos Islands of Ecuador is designated as (b), then choose the right statement in which the number of species is used instead of (a) and (b) :
 - (A) $a = 3$ and $b = 14$
 - (B) $a = 1$ and $b = 14$
 - (C) $a = 14$ and $b = 2$
 - (D) $a = 2$ and $b = 12$

4. Chromosomal mutations are proven to be an important factor in the course of evolution, especially when considering the neutral theory of molecular evolution. In one peculiar example, the Karyotype of one species (Species 1) contain chromosomes more than six times in the other (Species 2) closely related (in terms of morphology and anatomy) species. Choose the correct species pair from the below given name pairs that show this condition :
 - (A) Species 1-*Naja naja* and Species 2-*Naja nigricollis*
 - (B) Species 1-*Ophiophagus hanna* and Species 2-*Naja naja*
 - (C) Species 1-*Muntiacus reevesi* and Species 2-*Muntiacus muntjac*
 - (D) Species 1-*Rusa unicolor* and Species 2-*Rusa timorensis*

5. Which are the amino acids produced in the famous Miller-Urey experiment?
- (A) Leucine and Histidine (B) Isoleucine and Tyrosine
(C) Alanine and Glycine (D) Leucine and Glutamine
6. Which mass extinction event was known to be connected with Chicxulub crater?
- (A) K–T Extinction (B) P-T Extinction
(C) Ordovician-Silurian Extinction (D) Triassic-Jurassic Extinction
7. Choose the right name of the group of human populations found in the Indian region with which the Indigenous Andaman Islanders are more related :
- (A) Ancestral North Indians (B) Middle Easterners
(C) Ancestral South Indians (D) Central Asians
8. Coral reefs are known for their exceptional biodiversity and high primary productivity. Choose the false statement from the below given statements :
- (A) Corals carry symbiotic Archaea which are the major primary producers in Coral Reef Ecosystem
(B) Coral polyps carry Zooxanthella which are the major primary producers in Coral Reef Ecosystem
(C) Zooxanthella is able to use carbon dioxide and waste materials from their host
(D) Coral polyps carry flagellate protists which are the primary producers in coral reef ecosystems
9. The name of the theory proposed by Lynn Margulis to explain the evolution of eukaryotes is given in the following options. Choose the most used and correct name of the theory :
- (A) Mitochondrial Origin (B) Chloroplast Origin
(C) Endosymbiotic theory (D) Endoplasmic Origin
10. Below given names are of mammalian species which are distributed in South India. Choose the name of a species that is endemic to this region :
- (A) *Hemitragus jemlahicus* (B) *Nilgiritragus hylocrius*
(C) *Cuon alpinus* (D) *Bos gaurus*
11. The technique used by a researcher in which respondent unconsciously provides information of his own attitudes or feelings is :
- (A) Association techniques (B) Projective techniques
(C) Verbal techniques (D) Interview techniques

12. How long is the term of copyright protection in India?
- (A) Lifetime of the creator, plus 30 years after death
 (B) 10 years from the date of creation
 (C) Lifetime of the creator, plus 20 years after death
 (D) Lifetime of the creator, plus 60 years after death
13. A research design includes :
- (i) Choice between using qualitative or quantitative methods.
 (ii) A way of conducting research that is not grounded in theory.
 (iii) Procedures and techniques to be used for gathering information.
 (iv) Manipulating the circumstances, situation, or experience.
- (A) (iv) and (i) (B) (ii) and (iii)
 (C) (i) and (iii) (D) (ii) and (iv)
14. Order the various steps of the research process :
- (i) Data Analysis
 (ii) Hypothesis testing
 (iii) Formulating the hypothesis
 (iv) Determining sample design
- (A) (iv), (iii), (i), (ii) (B) (iii), (iv), (i), (ii)
 (C) (iv), (iii), (ii), (i) (D) (iii), (i), (iv), (ii)
15. In qualitative research, “triangulation” refers to :
- (A) Using three researchers to conduct the study
 (B) Validating data by cross-checking with multiple sources or methods
 (C) Analyzing data three times for consistency
 (D) The formation of hypotheses based on three theoretical frameworks
16. The sampling technique that a Researcher would recommend when the exact size and characteristics of the population are not known would have the following features :
- (i) Every member does not get equal chance in sample
 (ii) Own judgment is used to select a sample
 (iii) Random selection is opted
 (iv) Researcher may select individuals who are most accessible
- (A) (i), (iii) and (iv) (B) (i), (ii) and (iii)
 (C) (ii), (iii) and (iv) (D) (i), (ii) and (iv)

23. An ideal molecule that can diffuse directly across the cell membrane should be :
- (A) Large and hydrophilic (B) Small and non-polar
(C) Charged ions (D) Bound to carrier proteins
24. Which property of radioactive tracers makes them suitable in biological studies?
- (A) Long half-lives to ensure constant tracing
(B) Ability to emit visible light
(C) Detectable radiation emission without altering the system's chemistry
(D) High chemical reactivity
25. The chemical fixation during biological specimen preparation for TEM primarily helps for :
- (A) Preventing radiation damage
(B) Removing impurities
(C) Preserving the structural integrity of the sample
(D) Increasing electrical conductivity
26. How do temperature affect pH measurement?
- (A) Changes the conductivity of the solution
(B) Only affects alkaline solutions
(C) No effect on pH measurement
(D) Alters the ionization of water
27. What element in the body is primarily responsible for generating the MRI signal?
- (A) Carbon (B) Nitrogen
(C) Hydrogen (D) Oxygen
28. In spectrophotometry, what does a peak in the absorbance spectrum indicate?
- (A) Wavelength at which maximum light is absorbed
(B) Wavelength at which maximum light is transmitted
(C) Molecular weight of the sample
(D) Concentration of the sample
29. Which one is a limitation of immunoelectrophoresis?
- (A) Antibodies cannot be detected
(B) Very expensive equipments are required
(C) Time-consuming and requires skilled interpretation
(D) Not useful for detecting complex mixtures of proteins
30. Retention time (t_R) in HPLC refers to :
- (A) Total runtime of the chromatographic process
(B) Time a compound spends in the detector
(C) Time taken for the mobile phase to pass through the column
(D) Time between sample injection and elution of a compound

31. What is the source of the ATP used by muscles for vigorous activity that may last for 10 to 15 seconds?
- glycolysis of glucose in the cell cytoplasm forms ATP
 - the ATP that is stored in muscle cells as ATP
 - aerobic respiration in the mitochondria produces the ATP
 - creatinine phosphate in muscle and ADP react to form the required ATP
32. What is the function of “intrinsic factor” in gastric juice?
- to protect the stomach lining against hydrochloric acid
 - to activate pepsinogen
 - to assist with the absorption of vitamin B₁₂
 - it stimulates the release of gastrin
33. In a cross-section view of the spinal cord, there is a butterfly-shaped structure. What would the posterior grey horn of this structure primarily consist of?
- the axons of motor neurons
 - the cell bodies of interneurons
 - the cell bodies of sensory neurons
 - the cell bodies of motor neurons
34. What is the purpose of ‘blocking step’ in ELISA?
- To enhance the sensitivity of assay
 - To remove unbound antigens
 - To prevent non-specific binding of antibodies
 - To inhibit the activity of enzymes
35. The complement system is activated by :
- IgG and IgM
 - IgE and IgA
 - IgG and IgD
 - IgM and IgE
36. The type of T cells that recognize antigens presented by MHC Class I molecules :
- Memory T-cells
 - CD8+ T-cells
 - CD4+ T-cells
 - Regulatory T-cells
37. How does an enzyme accelerate a reaction?
- Increasing kinetic energy of the substrate
 - Increasing the free energy difference between the enzyme and substrate
 - Decreasing the energy required to form transition site
 - Decreasing the kinetic energy of substrate
38. Find the incorrect match :
- Tay-Sachs Disease : Abnormal glycosaminoglycan storage
 - Gaucher disease : Abnormal storage of glycosphingolipids
 - Phenylketonuria : High level of phenylalanine in blood
 - Galactosemia : Low level of galactose in blood

39. Aminoacids responsible for N-linked and O-linked glycosylation of proteins :
- (A) Asparagine and lysine (B) Asparagine and threonine
(C) Lysine and histidine (D) Tyrosine and serine
40. The role of thiolase enzyme in beta oxidation of fatty acid :
- (A) Hydrogenation (B) Dehydration
(C) Decarboxylation (D) Cleavage
41. Which of the following technique helps a researcher to follow the movements of molecules in the membranes of living cells using light microscope?
- (A) ELISA (B) FRAP
(C) STEM (D) TBST
42. Coated vesicles of Receptor-Mediated Endocytosis are coated with which of the following proteins?
- (A) COPI (B) COPII
(C) Clathrin (D) AP-1
43. Which among the following statement is true for RISC?
- (A) miRNA shuts down gene expression at post-transcriptional level
(B) siRNA shuts down gene expression at translational level
(C) miRNA shuts down gene expression at replication level
(D) siRNA shuts down gene expression at post-transcriptional level
44. Same messenger evoke different responses in different cells, what could be the correct reason for this among the following options?
- (i) Different cells have different set of receptors
(ii) Receptors of different cells are coupled to different internal machinery
- (A) Option (i) (B) Option (ii)
(C) Both option (i) and (ii) are correct (D) Both option (i) and (ii) are wrong
45. Which among the following is presumed to be the reason for cell detachment during apoptosis?
- (A) FAK (B) PKC
(C) CAD (D) PKB
46. Mice lacking a gene for claudin-1 dies of dehydration – what could be the reason for this?
- (A) Lack of water absorption in Henle's loop
(B) Lack of water absorption in the alimentary canal
(C) Water loss due to lack of tight junction
(D) Water loss due to excessive sweating

47. Which among the following can be described as epigenetic phenomena?
- (A) Histone methylation (B) DNA methylation
(C) Centromere determination (D) All above
48. Natural selection favoured the use of thymine rather than uracil in DNA – what could be the possible reason among the following options?
- (i) Thymine has higher resistance to photochemical mutation
(ii) Cytosine can be converted to uracil
- (A) Option (i) (B) Option (ii)
(C) Both (i) and (ii) (D) None
49. Protein named Maturation Promoting Factor (MPF) is responsible for initiating M-phase in a cell cycle. Which among the following is the regulatory unit of MPF protein?
- (A) Cyclin (B) Clathrin
(C) Caveolin (D) Cadherin
50. Among the following, which family of receptors attaches the cell to their extracellular microenvironment?
- (A) Cadherins (B) Selectins
(C) Integrins (D) None above
51. Which among the following statements concerning the development of the embryo is incorrect?
- (A) Reacting cells in a developing embryo can differentiate into a particular tissue under the influence of an inductor
(B) The competence for neural induction is restricted to the ectoderm
(C) Prospective potency of the epidermis area in an early gastrula is restricted to the nervous system and normal skin epithelium only
(D) On completion of gastrulation, there is a narrowing down of the prospective potency of embryonic tissues
52. Zona pellucida covering mammalian eggs contain :
- (i) Glycoproteins
(ii) Sulfated mucopolysaccharides
(iii) Hyaluronic acid
(iv) Sialic acid
- (A) (i), (ii) and (iii) only (B) (i), (ii) and (iv) only
(C) (ii), (iii) and (iv) only (D) (i), (ii), (iii) and (iv)
53. Identify the gene, the absence of whose product, leads to the production of hunchback protein throughout the insect embryo and inhibits the abdomen-generating gap genes :
- (A) Nanos gene (B) Pair-rule genes
(C) Torso gene (D) Bicoid gene

54. The phenomenon in which animals retain their juvenile form but the gonads and germline develop at a faster rate than normal, and they become sexually mature while the rest of the body is still in a juvenile phase :
- (A) Neoteny (B) Progenesis
(C) Direct development (D) All the above
55. Match the following :
- | | |
|--------------------------------|-----------------------------|
| (1) Prothoracicotropic Hormone | (a) molting |
| (2) 20-hydroxy ecdysone | (b) prevent metamorphosis |
| (3) Juvenile Hormone | (c) premature metamorphosis |
| (4) Precocenes | (d) production of ecdysone |
| (A) 1-c, 2-a, 3-b, 4-d | (B) 1-d, 2-c,3-a, 4-b |
| (C) 1-b, 2-c, 3-d, 4-a | (D) 1-d,2-a, 3-b,4-c |
56. Genomic imprinting in humans can result in :
- (i) Inactivation of the gene for insulin-like growth factor 2 (Igf-2) present on chromosome derived from the mother.
(ii) Activation of Igf-2r gene present on chromosome derived from the mother
- (A) Only (i) is correct (B) Only (ii) is correct
(C) Both (i) and (ii) are correct (D) Both (i) and (ii) are incorrect
57. Microsatellite DNA can be found within :
- (A) centromeres and telomeres, and regulatory flanking regions of genes
(B) centromeres and telomeres, and regulatory flanking regions and intronic regions of genes
(C) centromeres and telomeres, and regulatory flanking regions, intronic regions, and transcription units of genes
(D) centromeres and telomeres only
58. Which among the following can't be a reason for different phenotypic consequences of epigenetics?
- (A) a single nucleotide substitution
(B) a covalent modification of DNA (methylation of a base)
(C) A proteinaceous structure that assembles on DNA
(D) A protein aggregate that controls the conformation of new subunits as they are synthesized
59. Identify the incorrect statement :
- (A) Epistasis may be in only in one direction, from one particular gene pair to another, or in both directions when each gene pair is mutually epistatic to the other
(B) ABO blood group inheritance follows multiple allelism and co-dominance
(C) Human skin colour is influenced by polygenic inheritance and environmental factors
(D) The amount of DNA in the haploid genome of an organism is always directly proportional to the complexity of the organism

60. A man with congenital red-green colour blindness marries a normal woman :
- (A) Their daughters and granddaughters will be colour blind
 - (B) Their daughters will be carriers and grandsons can be colour blind
 - (C) Half of their daughters and sons can be colour blind
 - (D) Their sons and grandsons will be colour blind
61. Which among these is an example of niche partitioning?
- (A) Two species competing for same resource
 - (B) Two species using different resources in the same environment
 - (C) Two species occupying different habitat
 - (D) None of the above
62. Who proposed the Gaia hypothesis?
- (A) Shelford
 - (B) James Lovelock
 - (C) Stephen Jay Gould
 - (D) Liebig
63. What is the primary purpose of an ecological pyramid?
- (A) study nutrient cycle in an ecosystem
 - (B) compare productivity of different ecosystem
 - (C) study the flow of energy through an ecosystem
 - (D) all of the above
64. What is carrying capacity in ecology?
- (A) the rate at which population grow
 - (B) amount of resources available in an environment
 - (C) average number of individuals in a population over time
 - (D) maximum number of individuals that an environment can support indefinitely
65. What is the significance of edge effect in ecology?
- (A) increases the risk of species extinction
 - (B) increases the level of species richness
 - (C) decreases the level of species richness
 - (D) none of the above
66. What is the primary focus of the Lotka-Volterra hypothesis?
- (A) Ecosystem stability
 - (B) Mutualism and symbiosis
 - (C) Competition between species
 - (D) Predation and Prey dynamics

67. Which of the following is a common method of wetland reclamation?
(A) Planting of native vegetation (B) Construction of levees and dikes
(C) Dredging and filling (D) All of the above
68. What is the primary role of remote sensing in ecology?
(A) To develop mathematical models of ecosystem
(B) To collect field data on species population
(C) To monitor environmental changes and patterns over large areas
(D) All of the above
69. What is the aim of IPCC?
(A) Public awareness about climate change
(B) International climate change negotiations
(C) Provide funding for climate change research and projects
(D) Conduct climate change research and provide scientific advice to policy makers
70. What is the main objectives of Wildlife Protection Act of 1972?
(A) to promote ecotourism and wildlife based tourism
(B) to regulate trade and commerce of wildlife products
(C) provide a framework for the conservation and management of wildlife in India
(D) control spread of wildlife diseases
71. Teichoic acids are present in the cell walls of :
(A) Only gram-positive bacteria
(B) Only gram-negative bacteria
(C) Both gram positive and negative bacteria
(D) All prokaryotes
72. What will be the generation time of bacterial culture with a growth rate constant of 2 at its exponential phase of growth?
(A) 0.35 hours (B) 0.5 hours
(C) 1 hour (D) 2 hours
73. Nitrite is oxidised to nitrates in nitrogen cycle by members of which of the following genera?
(A) *Nitrosomonas* (B) *Thiobacillus*
(C) *Nitrobacter* (D) All of the above

74. HIV (Human Immunodeficiency Virus) is a :
- (A) Enveloped RNA virus (B) Non enveloped RNA Virus
(C) Enveloped DNA virus (D) Non enveloped DNA Virus
75. Oxidation of pyruvate results in the production of :
- (A) Succinyl Co-A (B) Acetyl Co-A
(C) Phospho Enol Pyruvate (D) Glucose
76. Proteins are separated in SDS-PAGE on the basis of their :
- (A) Charge (B) Affinity
(C) Structure (D) Size
77. *Lac Z* gene containing Multiple Cloning Sites (MCS) in plasmids encode for which of the following enzyme
- (A) Alpha — Galactosidase (B) Beta — Galactosidase
(C) Gamma — Galactosidase (D) None of the above
78. Which of the following is a commonly used cryo-protectant?
- (A) Water (B) 1% Cetavlon
(C) Glycerol (D) Glycine buffer
79. What is an Intellectual Property (IP) license?
- (A) Registration of IP (B) Permission to use IP
(C) Transfer of ownership (D) None of the above
80. Which protein structure is crucial for therapeutic protein stability?
- (A) Primary (B) Secondary
(C) Tertiary (D) Quaternary
81. Column A represents the scientific name of some agricultural pests and Column B represents the primary crop target of these pests in the random order :

Column A	Column B
(1) <i>Earias vittella</i>	(a) Banana
(2) <i>Chilo partellus</i>	(b) Cotton
(3) <i>Nilaparvata lugens</i>	(c) Cabbage
(4) <i>Pentalonia nigronervosa</i>	(d) Rice
(5) <i>Plutella xylostella</i>	(e) Maize

Choose the correct combination

- (A) (1)-(b), (2)-(a), (3)-(e), (4)-(c), (5)-(d)
(B) (1)-(b), (2)-(e), (3)-(d), (4)-(a), (5)-(c)
(C) (1)-(d), (2)-(c), (3)-(a), (4)-(e), (5)-(b)
(D) (1)-(e), (2)-(a), (3)-(d), (4)-(b), (5)-(c)

82. Which of the following fish is an exotic ornamental fish of Kerala?
 (A) *Dawkinsia filamentosa* (B) *Aplocheilus lineatus*
 (C) *Cyprinus rubrofuscus* (D) *Horabagrus brachysoma*
83. Which of the following is an example of protistan disease in aquarium fish?
 (A) Costiasis (B) Gyrodactylosis
 (C) Lernaeasis (D) Dropsy
84. What is the chromosomal composition of an individual with Klinefelter's syndrome?
 (A) 21AA+A+XY (B) 22AA+X
 (C) 22AA+XXY (D) 18AA+A+XX
85. Which of the following is/are the endemic bird(s) of the Western Ghats?
 (i) Rufous Treepie
 (ii) Grey-headed Bulbul
 (iii) Indian Roller
 (iv) Black-and-Orange Flycatcher
 (v) White-throated Kingfisher
 Choose the correct answer :
 (A) (ii) and (iv) (B) (iii) only
 (C) (ii) and (v) (D) (i) only
86. Which of the following statements are true about the applications of PCR in molecular diagnosis?
 (i) PCR has wide application for detection of infectious diseases and cancer diagnosis.
 (ii) PCR is effective for diagnosing the diseases caused by prions.
 (iii) Parental diagnosis of specified disorders can be possible by using PCR.
 (iv) PCR amplifies the specific DNA sequence and can sequence the entire genome
 Choose the correct answer
 (A) (ii) and (iii) (B) (i) and (iv)
 (C) (ii) and (iv) (D) (i) and (iii)
87. Which of the following factors is most critical in minimizing false-positive results in molecular diagnostic assays?
 (A) Use of high-fidelity polymerases
 (B) Implementation of rigorous contamination control measures
 (C) Increasing the number of amplification cycles
 (D) Using gel electrophoresis to confirm product size

88. Which biochemical finding is most indicative of a defect in fatty acid oxidation, such as medium-chain acyl-CoA dehydrogenase (MCAD) deficiency?
- (A) Elevated serum lactate levels
 - (B) Hyperammonemia
 - (C) Hypoketotic hypoglycemia
 - (D) Elevated serum ceramide levels
89. Which of the following statements correctly classifies the mammals based on their reproductive characters?
- (A) Prototheria – oviparous, pouch development, placenta nourishment
 - (B) Monotremes – viviparous, no pouch development, placenta nourishment
 - (C) Eutheria – viviparous, no pouch development, placenta nourishment
 - (D) Metatheria – oviparous, pouch development, placenta nourishment
90. Which of the following is the smallest live feed commonly used as a starter feed for newly hatched fish larvae?
- (A) Rotifers
 - (B) Artemia
 - (C) Daphnia
 - (D) Infusoria
91. What distinguishes chimeric antigen receptor (CAR) T-cells from normal T-cells in their ability to fight cancer?
- (A) CAR-T cells produce antibodies to neutralize cancer antigens
 - (B) CAR-T cells are equipped with synthetic receptors to identify specific tumour antigens independent of MHC presentation
 - (C) CAR-T cells have enhanced cytokine production to promote cancer cell apoptosis
 - (D) CAR-T cells are resistant to immune checkpoint inhibition by tumours
92. What renders CRISPR different from other repetitive DNA sequences?
- (A) The repeats are interspaced by similarly sized non-repetitive DNA and they are clustered in one or several loci on the chromosome
 - (B) The CRISPR sequences are mobile genetic elements that randomly insert into the genome, similar to transposons
 - (C) The repeats function solely as a template for RNA polymerase binding and do not encode any functional molecules
 - (D) The spacer sequences are identical copies of the repeats, serving no functional diversity

93. Which of the following statements about Intracytoplasmic Sperm Injection (ICSI) is Incorrect?
- (A) ICSI bypasses the natural sperm selection process by directly injecting a single sperm into the oocyte cytoplasm
 - (B) ICSI requires oocytes at the metaphase II (MII) stage to maximize fertilization success
 - (C) Embryos resulting from ICSI are guaranteed to have normal genetic material as the sperm bypasses the acrosome reaction
 - (D) ICSI is primarily indicated for severe male-factor infertility, such as low sperm count or motility
94. In the context of the recent controversies surrounding gender testing in Olympic boxing, particularly with athletes possessing XY chromosomes, what role does the SRY gene play in the development of sexual characteristics?
- (A) The SRY gene induces the formation of testes in XY individuals, leading to the production of testosterone and the development of male sexual characteristics
 - (B) The SRY gene prevents the development of male sexual characteristics in XY individuals and leads to the formation of ovaries instead
 - (C) The SRY gene causes the development of female reproductive organs in XY individuals, overriding the typical male sex-differentiating effects
 - (D) The SRY gene is responsible for the formation of external male genitalia but has no effect on internal reproductive organs in XY individuals
95. Katalin Karikó and Drew Weissman were awarded the Nobel Prize in Physiology or Medicine for their research that led to the development of mRNA vaccines for COVID-19. What key discovery did they make regarding mRNA that enabled its use as a therapeutic tool?
- (A) They developed a method to stabilize mRNA by encapsulating it in lipid nanoparticles, making it suitable for use in vaccines
 - (B) They identified that chemical modifications in mRNA could reduce immune system activation and enhance protein production
 - (C) They discovered how to synthesize mRNA in large quantities, overcoming previous limitations in production
 - (D) They found that mRNA could be used as a replacement for DNA in gene therapy applications
96. Victor Ambros and Gary Ruvkun were awarded the 2024 Nobel Prize in Physiology or Medicine for their groundbreaking work on small RNA molecules. What did their research on the *lin-4* gene in *C. elegans* reveal about gene regulation?
- (A) The *lin-4* gene produces a small RNA that accelerates the production of proteins by binding to mRNA
 - (B) The *lin-4* gene produces a small RNA that regulates gene expression by preventing the formation of complementary mRNA sequences
 - (C) The *lin-4* gene produces a small RNA that inhibits protein production by binding to complementary sequences in the *lin-14* mRNA
 - (D) The *lin-4* gene produces a small RNA that is responsible for initiating the transcription of the *lin-14* gene

97. What unique evolutionary trait was observed in the newly discovered horned dinosaur *Lokiceratops rangiformis*?
- (A) Ability to glide between trees
 - (B) Unique skull and horn patterns driven by sexual selection
 - (C) Adaptation for aquatic environments
 - (D) Evidence of social nesting behavior
98. What recent discovery has provided evidence for learning capabilities in unicellular organisms?
- (A) *Stentor roeseli* showed adaptive responses to repeated stimuli, supporting a form of elementary learning
 - (B) Memory storage in single cells is attributed solely to synaptic plasticity
 - (C) DNA methylation in unicellular organisms is exclusively linked to fatigue responses
 - (D) Single-cell learning mechanisms rely entirely on extracellular molecular interactions
99. Which of the following recent discoveries has increased concerns about the potential spread of HPAI H5N1 to humans?:
- (A) H5N1 virus has been detected in bovine milk, raising concerns about transmission to mammals
 - (B) The virus is now capable of airborne transmission between mammals, including humans
 - (C) H5N1 has become resistant to all antiviral medications currently available
 - (D) There has been a significant decrease in human immunity to H5N1 globally
100. Which of the following is a key finding from the recent study that reconstructed the Tree of Life for modern birds?
- (A) The diversification of modern birds occurred over a period of 50 million years
 - (B) The study identified a new grouping of birds called “Elementaves,” which includes penguins, pelicans and hummingbirds
 - (C) The major bird groups, including Neoaves, evolved exclusively in the Southern Hemisphere
 - (D) The study revealed that songbirds and parrots share a distant relationship, not a close one

SPACE FOR ROUGH WORK

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