

Biology 111

In-class Exam #4

April 22, 2009

For each question or statement select the best answer or completion. Mark your selections on a scantron form using a pencil.

NOTE: a copy of the genetic code appears as the last page of this exam

1. In 1870 Fredrich Meicher was the first to isolate and characterize nucleic acid (DNA and RNA) which he extracted from...
 - a) pigeon blood
 - b) the puss of patient wounds
 - c) spinach
 - d) rocks
 - e) purified water
2. Between the discovery of chromosomes in late 1800's and experiments in the 1940's and 1950's most scientists believed that the genetic information stored in the nucleus was in the form of
 - a) diamonds
 - b) lipids
 - c) DNA
 - d) phosphates
 - e) proteins
3. In 1928 Fred Griffith discovered bacterial transformation when he...
 - a) found penicillin killed bacteria
 - b) analyzed the elemental content of rice
 - c) combined dead avirulent bacteria and living virulent bacteria
 - d) dredged the Thames river
 - e) combined dead virulent bacteria and living avirulent bacteria
4. A team of three researchers in 1944 led by _____ provided the first evidence that DNA was involved in genetic information storage.
 - a) Charles Darwin
 - b) Fredrich Meicher
 - c) Gregor Mendel
 - d) Oswald Avery
 - e) Francis Crick
5. In their experiment they combined ...
 - a) dead avirulent bacteria with DNAase
 - b) beans with wild rice
 - c) dead virulent bacteria with DNAase
 - d) dead avirulent bacteria and living virulent bacteria
 - e) a new agenda for molecular biology with older methods
6. Bacteriophages, or phages as they are generally called, are...
 - a) desert rodents
 - b) free radicals
 - c) algae
 - d) viruses
 - e) amphibians
7. In their work with bacteriophages, Martha Chase and Alfred Hershey combined...
 - a) radioactive phages with wild rice
 - b) radioactive phages with bacteria
 - c) radioactive phages with dead virulent bacteria
 - d) radioactive phages with dead avirulent bacteria
 - e) radioactive phages with a new agenda for molecular biology
8. In 1950 Erwin Chargaff published "Chargaff's rule": that in DNA the proportion of _____ was always equal to the proportion of A.
 - a) A
 - b) T
 - c) C
 - d) G
 - e) W
9. Rosalind Franklin worked towards discovering the structure of DNA using the technique of ...
 - a) X-ray crystallography
 - b) radioactive annealing
 - c) carbon sequestration
 - d) sun bathing
 - e) retroactive chromatography

10. She discovered that DNA was ...
- a) 2 nanometers wide and contained repeating units of 3.4 and 0.34 nanometers
 - b) 2 micrometers wide and contained repeating units of 3.4 and 0.34 micrometers
 - c) 2 millimeters wide and contained repeating units of 3.4 and 0.34 millimeters
 - d) 2 centimeters wide and contained repeating units of 3.4 and 0.34 centimeters
 - e) 2 meters wide and contained repeating units of 3.4 and 0.34 meters
11. While only using data collected by someone else, it was _____ who actually described the correct structure of DNA.
- a) Francis Crick
 - b) Maurice Wilkins
 - c) Rosalind Franklin
 - d) James Watson
 - e) both Crick and Watson
12. Rosalind Franklin did not win a share of the Nobel prize primarily because ...
- a) she was not a member of the Nobel Society
 - b) she died young
 - c) they didn't start awarding the Nobel prize until 1960
 - d) women could not receive the award until after 1960
 - e) she refused it
13. The solved structure of the DNA molecule as first described in 1952 included ...
- a) double stands
 - b) base pairing
 - c) anti-parallel strands
 - d) a and b only
 - e) a, b, and c
14. The solved structure immediately suggested the mechanism of
- a) RNA transcription
 - b) DNA replication
 - c) bacterial transformation
 - d) transduction
 - e) translation
15. The field of Developmental Biology has as its central dogma the theory of genomic equivalence, which states that ...
- a) all organisms of a species contain identical DNA
 - b) genes are all the same
 - c) all organisms have the same number of chromosomes
 - d) all cells of an organism contain the same complete set of genes
 - e) both b and c
16. Each of the following, except _____, appear only possible if the theory of genomic equivalence is true.
- a) regeneration of severed limbs of salamanders
 - b) natural existence of identical twins in mammals
 - c) tissue culture growth of whole plants from leaf pieces
 - d) cloning of mammals from single adult cells
 - e) anaerobic respiration by bacteria
17. The "Spemann Organizer" was discovered in the lab of Hans Spemann in 1924 and refers to a region of cells in young amphibian embryos ...
- a) that direct adjacent cells to give rise to the head
 - b) that mark the location of the mouth
 - c) that form the spinal column
 - d) that will normally give rise to the heart
 - e) that are always darkly pigmented
18. Transplantation of the Spemann Organizer from one young salamander embryo to the ventral side of another young salamander embryo results in ...
- a) a darkly pigmented salamander
 - b) a two headed salamander
 - c) a salamander with two mouths
 - d) a salamander with two hearts
 - e) a salamander with two spines

19. The first, and seemingly easiest, multicellular organisms to clone are ...
 a) monkeys b) fish c) bacteria d) plants e) salamanders
20. Totipotency is a feature of...
 a) plants b) humans c) salamanders but not frogs d) all mammals e) frogs but not salamanders
21. Successful cloning of adult frogs from cells of adult frogs was first achieved in 1970 using the technique of
 a) serial nuclear transfer b) vascular dilation c) invitro fertilization
 d) cross pollination e) still secret
22. The technical breakthrough that, in 1996, allowed experiments to successfully clone the first mammal, "Dolly" the sheep, was ...
 a) serial nuclear transfer b) vascular dilation c) invitro fertilization
 d) cross pollination e) still secret
23. Dolly the sheep ...
 a) died in a plane crash during transport b) lives on a farm in Australia
 c) died prematurely with numerous ailments d) was found to have two hearts
 e) both b and d
24. Numerous mammalian species have been cloned successfully in recent years, but one that has **not** been cloned is...
 a) cattle b) sheep c) humans d) mice e) cats
25. The first cloning of a domestic cat ("CC" cloned from "Rainbow") demonstrates that...
 a) cats are dumb animals b) cats are smart animals
 c) cloned animals can be physically different from the source animal
 d) cloned animals are in all ways physically identical to the source animal
 e) dogs would have been easier to clone
26. The lab that has had the greatest success cloning mammals (i.e. produced the greatest number of adult clones) is a lab in Japan which has cloned more than several dozen _____ .
 a) mice b) monkeys c) cattle d) humans e) goats
27. The Japanese researchers found that their cloned animals frequently ...
 a) are unhealthy and die at an early age
 b) have longer than usual life spans
 c) have about the same health and longevity as normal animals
 d) have extra limbs
 e) both b and d
28. Transcription refers to...
 a) replication of DNA b) copying DNA into protein c) copying DNA into RNA
 d) copying protein into DNA e) copying RNA into DNA
29. The three types of RNA functional in translation include:
 a) xRNA, dRNA, and tRNA b) mRNA, rRNA, and tRNA c) sRNA, rRNA, and wRNA
 d) mRNA, vRNA, and tRNA e) xRNA, rRNA, and yRNA

30. RNA polymerase does **not** ...
 a) exist as a large enzyme complex
 b) function in transcription
 c) function in translation
 d) separates strands of DNA
 e) assembles a strand of RNA
31. RNA contains only the nucleotides abbreviated by the following letters:
 a) ACGT b) ACGU c) ABCD d) WXZQ e) ATGU
32. Ribosomal subunits are assembled ...
 a) in the nucleolus b) at night only c) in bacteria only
 d) in animal cells only e) b and c
33. Ribosomal subunits consist of ...
 a) DNA and proteins b) DNA and dRNA molecules c) protein only
 d) xRNA molecules and proteins e) rRNA molecules and proteins
34. Ribosomes consist of ...
 a) a large and a small subunit b) a large, a medium, and a small subunit c) three small subunits
 d) three large subunits e) three medium subunits
35. The function of tRNA is ...
 a) to carry DNA to ribosomes b) to carry amino acids to ribosomes c) unknown
 d) a and b e) hold chromosomes together
36. Production of protein by ribosomes is called
 a) transformation b) transduction c) translation d) transcription e) translocation
37. What would be the protein sequence produced by translation if the following mRNA sequence?
 AUGGGGCCACGU
 a) TACCCCGGTGCA b) ATGGGGCCACGT c) methionine, glycine, proline, arginine
 d) methionine, proline, arginine, cysteine e) phenylalanine, glycine, serine, leucine
38. Examination of the genetic code suggests the all bases of the codons are not equally important with the _____ base as the least important.
 a) first b) second c) third d) fourth e) fifth
39. Which amino acid is designated by the greatest number of codons?
 a) arginine b) tryptophan c) cysteine d) tyrosine e) valine
40. Which amino acid is designated by the fewest number of codons?
 a) arginine b) tryptophan c) cysteine d) tyrosine e) valine
41. In translation the large ribosomal subunit does **NOT**...
 a) bind to the small subunit b) bind to DNA c) bind to mRNA
 d) bind to tRNA e) consist of RNA and protein

42. So called frameshift mutations result from...
- switching of individual nucleotides in the coding sequence of a gene
 - switching of individual nucleotides in the promoter sequence of a gene
 - insertions or deletions in the coding sequence of a gene
 - insertions or deletions in the promoter sequence of a gene
 - either a or b
43. So called point mutations result from...
- switching of individual nucleotides in the coding sequence of a gene
 - switching of individual nucleotides in the promoter sequence of a gene
 - insertions or deletions in the coding sequence of a gene
 - insertions or deletions in the promoter sequence of a gene
 - either a or b
44. An example of a neutral mutation would occur if the DNA sequence CTC was mutated to _____
- ATC
 - CAC
 - ABC
 - CTT
 - a and b
45. A more serious mutation would occur if the DNA sequence CTC was mutated to _____
- ATC
 - CAC
 - ABC
 - CTT
 - a and b
46. Genetic regulation involving operons occurs in:
- all organisms
 - animals
 - plants
 - bacteria
 - both animals and plants
47. In the presence of lactose E.coli
- shuts down glucose metabolism
 - begins fermentation
 - expresses three genes including one encoding galactosidase
 - hibernates
 - begins production of putracine
48. In order, the lac operon consists of:
- operator, promoter, structural genes
 - structural genes only
 - structural genes, promoter, operator
 - repressor, operator, structural genes
 - promoter, operator, structural genes
49. The repressor protein binds to _____ of the lac operon.
- operator
 - regulator gene
 - promoter
 - structural genes
 - both b and c
50. The trp operon differs from the lac operon in that it is an example of a __1__ operon, while the lac operon is an example of as __2__ operon.
1. essential 2. binary
 1. binary 2. essential
 1. essential 2. repressible
 1. inducible 2. repressible
 1. repressible 2. inducible