

1. To properly understand DNA fingerprint data it is necessary
  - a. to know at least two alleles in the target individuals
  - b. to be sure that these are dominant alleles
  - c. that the frequency of alleles is known in the overall population
  - d. that the frequency of alleles is known for family members
  - e. that no inbreeding occur
2. Genetic Drift describes
  - a. a situation with mutations building up in a population
  - b. the act of selection pushing allele frequency
  - c. the effect of different species separating from each other
  - d. the effect of chance on allele frequency
  - e. balanced polymorphism
3. Natural Selection affects organisms
  - a. uniformly throughout their life times
  - b. unevenly and sometimes unpredictably
  - c. to keep their allele frequencies from changing
  - d. only after they are done reproducing
  - e. based on their genotypes
4. Response to selection (R) is dependent on
  - a. the selection differential (s)
  - b. the quotient for Hardy-Weinberg (w)
  - c. the heritability ( $h^2$ )
  - d. a and b
  - e. a and c
5. An example of stabilizing selection is
  - a. the pepper-moth in industrial England
  - b. the loss of the mid-range size pollinator for a population of varying flower sizes
  - c. bill size in Darwin's finches after drought
  - d. birth weight in human babies
  - e. all of the above
6. For an allele to increase in frequency it must be
  - a. much better than the other allele
  - b. somewhat better than the other allele
  - c. selected against
  - d. a recessive dominant
  - e. underdominant
7. An example of pleiotropic effects of selection would be
  - a. length of tail feathers in female peahens
  - b. the correlation of high protein corn with small, hard kernels
  - c. the ability of drosophila to be used as laboratory test organisms
  - d. the strength of selection
  - e. none of the above
8. Opposing evolutionary forces would be
  - a. mutation and drift
  - b. mutation and migration
  - c. selection and drift
  - d. fixation and selection
  - e. all of the above
9. Which of the three basic modes of selection act to decrease variation for a trait
  - a. disruptive selection
  - b. diversifying selection
  - c. directional selection
  - d. stabilizing selection
  - e. balancing selection
10. In our discussion of Big Foot and the Lock Ness monster it was clear that they were unlikely to exist because of the effect of
  - a. mutation
  - b. drift
  - c. founder effect
  - d. effective population size
  - e. selection

11. For Hawaiian *Drosophila* and evolutionary model predicts
- which species should be most closely related based on geographical distribution
  - relatedness in line with the age of the islands
  - shifts in resource use
  - adaptive radiation from a few founders
  - all of the above
12. The Founder effect
- is part of the Hardy-Weinberg equilibrium
  - creates a different allele frequency from the source population
  - keeps the allele frequency the same as the source population
  - operates as an isolating mechanism
  - is usually overcome by rapid mutations
13. The Biological Species Concept emphasizes
- species with similar niches and behavior
  - morphologically similar populations together
  - the ability interbreed within but not between species
  - an open gene pool
  - founder effects
14. An important cause of species formation is
- inbreeding
  - fixation
  - geographical isolation
  - bottlenecks
  - long necks
15. Which one of these statements was NOT used by Darwin to derive his theory of evolution?
- variation exists in all organisms
  - more individuals are produced than can survive each generation
  - competition exists
  - organisms do not change through time
  - geological processes occur in a uniform manner
16. For the collared lizard populations what factor(s) was most important in their decline
- mutation
  - selection
  - drift
  - disease
  - migration
17. An organism that originated in Hawaii and found nowhere else is described as
- Darwinian
  - Endemic
  - Adaptive
  - Selective
  - Competitive
18. Homologous structures have
- the same function and appearance
  - different appearances but the same function
  - the same origin but may have different appearances
  - different origin but may have the same appearance
  - none of the above
19. The Law of Succession
- describes how Darwin saw evolution working
  - is necessary for uniform geological processes to occur
  - is a type of natural selection
  - describes the similarity of living and fossil organisms in the same area
  - describes the similar embryological development of related organism

20. The chief agent of natural selection is
- the genotype
  - variation
  - adaptation
  - Hardy-Weinberg
  - The environment
21. Average heterozygosity and percent of polymorphic loci
- are used to differentiate species and genera
  - are measures of fitness
  - indicate hybridization
  - are measures of genetic diversity
  - are calculated from DNA sequences
22. Preadaptation
- describes the novel use of a preexisting structure
  - a consistent evolutionary use of a preexisting structure
  - new uses for new structures
  - “throw back” to old uses of preexisting structures
  - the forward direction of selection
23. Evolution is
- forward looking
  - reflective of what worked in the past
  - aimed at the perfect adaptation
  - a product of preadaptation
  - dependent on the formation of new species
24. In an evolutionary sense adaptation means
- ability to respond to day to day environmental variations
  - ability to respond quickly to environmental variations
  - better survival for organisms with a particular trait than for ones lacking that trait
  - each generation changes its responses
  - the production of more mutations
25. When the heterozygote is better adapted than either *homozygote*
- recessive alleles only persist in the population
  - dominant alleles only persist in the population
  - there is no drift
  - this is overdominance
  - this is underdominance
26. Sickle cell anemia is caused by
- too many heterozygotes
  - a deletion
  - an inversion
  - too few homozygotes
  - none of the above
27. Inbreeding
- causes an increase in Hardy-Weinberg equilibrium
  - a duplication
  - exposure of deleterious alleles to selection
  - competition
  - higher fitness
28. The role of mutation in evolution is
- to push evolution in a particular direction
  - provide basic variation
  - allow evolvability
  - a and c
  - b and c
29. Sexual reproduction
- requires different allele frequencies
  - causes deviation from Hardy-Weinberg equilibrium
  - requires equal allele frequencies
  - is not a mechanism for evolutionary change
  - decreases variation

30. Hardy-Weinberg equilibrium
- defines the actual state of many organisms
  - provides a theoretical basis for understanding evolutionary change
  - is not used to study evolution
  - reflects the strength of preadaptation
  - is not affected by changes in allele frequency
31. Chromosomal changes that link genes are typically
- mutations
  - deletions
  - polyploidy
  - inversions
  - reversions
32. The immediate source of variation in sexually reproducing organisms is
- mutation
  - inversion
  - recombination
  - selection on genotype
  - clinal distribution of alleles
33. What kind of variation is not observed in protein electrophoresis?
- expressed variation
  - changes that produce no change in proteins (enzymes)
  - mutations
  - non-synonymous protein substitutions
  - all of the above
34. Genetic identity is
- part of Hardy Weinberg
  - necessary for sexual reproduction
  - amount of genetic similarity between populations, subspecies and genera
  - allele frequency taken at random
  - measure of geographic dispersion of populations
35. Under conditions of Hardy-Weinberg equilibrium
- there is clear evolution
  - the frequencies of alleles remain unchanged from generation to generation
  - there are new mutations introduced into each generation
  - selection coefficients are strong
  - sexual reproduction is not allowed

36. Describe the role of variation in evolution.

(5 pts) provides the basis on which selection acts to choose the most favorable (adapted) types, without variation populations and species cannot evolve

37. Explain the principle underlying the use of model organisms such as rats and mice in studies on drugs that will later be used on humans. (5 pts)

Homologous organisms. Because they are also mammals they have many homologous systems and will respond similarly to us.

38. What is Darwinian fitness? (5 pts)

Successful passing on of genes to the next generation

39. What is the role of migration or gene flow in maintaining species? (5 pts)

Homogenizes variation. This maintains the species with a uniform gene frequency and prevents separation into subsets with differing gene frequencies

40. Evolution has been defined in two ways so far in this course. These are \_\_\_\_\_ and \_\_\_\_\_.

Explain what each one means and why we have these two definitions (10 pts)

Descent with modification-overall effect of evolution in producing lineages of organisms.

Gradual modification of species into other species, descended from a common ancestor, allows us to trace relationships, larger scale

Change in gene frequency-population level evolution where selection and other factors produce a change in the frequency of alleles (genes) in the population from one generation to the next (over many generations produces new species) This allows us to see evolution taking place

