The Origin of Species

1. Which one of the following statements about the new mosquito species in the London Underground is not true?

a) The aboveground mosquito usually feeds upon humans but the new underground species feeds upon bats.

b) Unlike the seasonally breeding aboveground mosquito, the new underground species breeds year round.

c) When members of the two mosquito species were bred with each other, no offspring were produced.

d) The new species can mate in confined spaces, while the aboveground species cannot.

e) The new underground species of mosquito must have evolved since the subway tunnels were constructed about 150 years ago.

2. A biological species is defined as a

a) group of phenotypically indistinguishable organisms

b) group of organisms that are phenotypically similar and that share a high proportion of genes

c) group of organisms that share an ancestral-descendant sequence

d) population or group of geographically contiguous populations whose members are phenotypically similar

e) population or group of populations whose members have the potential to interbreed and produce fertile offspring

3. Which one of the following statements is not true?

a) Taxonomy is the branch of biology concerned with naming and classifying the diverse

forms of life.

b) The ecological species concept identifies species in terms of their ecological niches.

c) The genealogical species concept defines a species as a set of organisms that represents one
tip on the branching tree of life.

d) The morphological species concept relies upon identifying genotypic diversity and
comparing the nucleotides of genes.

e) The biological species concept is useless for organisms that are completely asexual in their reproduction.

4. Speciation can occur as a result of reproductive isolation. Reproductive isolation can occur when individuals in two populations of organisms

a) can't mate with each other because mating occurs at different times
b) mate with each other but produce offspring that are nonviable
c) use different types of behavior to attract mates
d) have anatomical features that make it difficult for organisms from the different populations to mate and transfer sex cells
e) All of the choices are correct

5. Which of the following types of reproductive barriers separates a pair of species that could
interbreed except that one mates at dusk and the other at dawn?

a) temporal isolation

b) habitat isolation

c) behavioral isolation

d) mechanical isolation

e) gametic isolation

6. Which of the following types of reproductive barriers separates a pair of insect species that
could interbreed except that one mates on goldenrod flowers and the other on autumn

daisies
that blossom at the same time?

a) temporal isolation

b) habitat isolation

c) behavioral isolation

d) mechanical isolation

e) gametic isolation

7. Which of the following types of reproductive barriers separates a pair of moth species that
could interbreed except that the females' mating pheromones are not attractive to the males of
the other species?

a) temporal isolation

b) habitat isolation

c) behavioral isolation

d) mechanical isolation

e) gametic isolation

8. Which of the following types of reproductive barriers separates two flowering plant species
that could interbreed except that one has a deep flower tube and is pollinated by bumblebees,
whereas the other has a short, narrow flower tube and is pollinated by honeybees?

a) temporal isolation

b) habitat isolation

c) behavioral isolation

d) mechanical isolation

e) gametic-isolation

9. Which of the following types of reproductive barriers separates two species that

occasionally mate but in whom the sperm do not produce the right enzymes to enter the egg?

a) temporal isolation

b) habitat isolation

c) behavioral isolation

d) mechanical isolation

e) gametic isolation

10. Two species that occasionally mate and produce zygotes, but which have incompatible genes that prevent the resulting embryo from developing, are separated by

a) gametic isolation

b) hybrid sterility

c) hybrid inviability

d) hybrid breakdown

e) hybrid competition

11. Two species interbreed occasionally and produce vigorous, fertile hybrids. When the hybrids breed with each other or with either parent species, however, the offspring are feeble or sterile. These species are separated by

a) gametic isolation

b) hybrid sterility

c) hybrid inviability

d) hybrid breakdown

e) hybrid competition

12. Two species that sometimes mate and produce vigorous, sterile offspring are separated by

a) gametic isolation

b) hybrid sterility

c) hybrid inviability

d) hybrid breakdown

e) hybrid competition

13. Perfume-like chemicals that are released into the air and signal another individual of the same species to alter its behavior are called

a) scents

b) odoriphores

c) pheromones

d) endocrines

e) None of the choices are correct

14. Which of the following prevents closely related species from interbreeding even when their ranges overlap?

a) genetic incompatibility

b) reproductive barriers

c) taboo

d) human intervention

e) None of the choices are correct.

15. Not infrequently, a group of related species will each have a unique courtship ritual that must be performed correctly for both partners to be willing to mate. Such a ritual constitutes a type of

a) postzygotic barrier

b) behavioral isolating mechanism

c) mechanical isolating mechanism

d) postzygotic barrier and behavioral isolating mechanism

e) postzygotic barrier and mechanical isolating mechanism

16. Which one of the following is an example of a hybrid that is both vigorous and sterile?

a) a cross between a thoroughbred racehorse and a mustang horse

b) a pony

c) a donkey

d) a mule

e) a colt

17. The Monterey pine and Bishop's pine inhabit some of the same areas of central California. The Monterey pine releases pollen in February, while the Bishop's pine does so in April. This is an example of _____isolation.

a) behavioral

b) postzygotic

c) temporal

d) habitat

e) mechanical

18. A hummingbird with a beak that is too short to pollinate a flower is an example of

a) behavioral isolation

b) reproductive isolation

c) mechanical isolation

d) gametic isolation

e) postzygotic factors

19. Speciation that involves a population that has become separated from the rest of the species by a geographical barrier that prevents gene flow, and that evolves into a new species, is called _____ speciation.

a) isolate

b) parapatric

c) sympatric

d) allopatric

e) biogeographic

20. The likelihood of allopatric speciation increases when a population is _____and
_____ the broader range of the species.

a) small…isolated from

b) large…nearby

c) large…isolated from

d) small…nearby

e) large…continuous with

21. A mountain range divides a freshwater snail species into two isolated populations. Erosion
eventually lowers the range and brings the two populations together again, but when they
mate, the resulting hybrids all produce sterile young. This scenario is an example of

a) sympatric speciation

b) allopatric speciation

c) incipient speciation

d) gradualism

e) punctuated equilibrium

22. Which of the following situations would be most conducive to rapid speciation? (Assume the conditions described persist as long as necessary.)

a) A bunchgrass population is split in two by the Grand Canyon. Every few years, strong
winds carry bunchgrass pollen across the canyon.

b) A Japanese mollusk species whose larvae are often carried from port to port in ship bilge
now flourishes in San Francisco Bay.

c) Bighorn sheep occupy mountainous terrain from Canada through Death Valley,

interbreeding all the way. The populations at the two ends of the range live in very
different environments.

d) Four circus wolves escape on Long Island. To everyone's surprise, they establish a small but viable population, coexisting successfully with humans in a partly suburban environment. The population is isolated from other wolves.

e) The growth of the Isthmus of Panama separates an abundant shrimp species into two large, completely isolated populations.

23. The emergence of numerous species from a common ancestor that finds itself in a new and diverse environment is called

a) adaptive radiation

b) bushy evolution

c) diversifying selection

d) allopatric radiation

e) adaptive opportunism

24. Which one of the following statements about the Gahpagos finches is <u>not</u> true?

a) There are 14 species of Galapagos finches.

b) The Galapagos finch species differ in their feeding habitats.

c) The common ancestor of the Galapagos finches appears to have come from the island of
Cocos.

d) Most speciation events of the Galapagos finches occurred when some finches made it to
another island and evolved by allopatric speciation.

e) The evolution of the Galapagos finches is an excellent example of adaptive radiation.

25. Speciation without geographic isolation is called _____speciation.

a) diversifying

b) allopatric

c) pseudogeographic

d) sympatric

e) adaptive

26. Which of the following is a mechanism by which a new, reproductively isolated plant species can be produced in a single generation?

a) self-pollination to produce a diploid zygote

b) self-pollination to produce a triploid zygote

c) self-pollination to produce a tetraploid zygote

d) hybridization between two species followed by self-pollination of the hybrid to produce a
diploid zygote

e) hybridization between two species followed by self-pollination of the hybrid to produce a tetraploid zygote

27. Organisms having more than two complete sets of chromosomes are said to be

a) haploid

b) polyploid

c) chimeric

d) hybrids

e) multinucleate

28. When a tetraploid plant pollinates a diploid plant of the parental species, what will be the
ploidy of the resulting zygote?

a) pentaploid

b) diploid

c) triploid

d) haploid

e) tetraploid

29. Sympatric speciation was first discovered by while studying the genetic diversity in primroses.

a) de Vries

b) Darwin

c) Buffon

d) Larmarck

e) Aristotle

30. Most polyploid species arise from

a) a single diploid parent plant

b) a single triploid parent plant

c) a single tetraploid parent plant

d) the hybridization of two parent species

e) the hybridization of a diploid and a tetraploid parent species

31. Most polyploid species result from

a) two accidental events: the hybridization of two parent species and a cell division error in the resultant hybrid

b) two accidental events: the production of gametes by mitosis followed by self-fertilization

c) two accidental events: the production of gametes by mitosis in one species that then
hybridizes with another species that produced its gametes by meiosis

d) three accidental events: the production of gametes by mitosis, self-fertilization, and
subsequent hybridization with a diploid species that produced gametes by meiosis

e) three accidental events: the production of gametes by mitosis, self-fertilization, and
subsequent hybridization with another species that also produced gametes by mitosis and

then self-fertilized

32. Which of the following are polyploid plants?

a) oats

b) potatoes

c) bananas

d) coffee beans

e) All of the choices are, polyploid plants

33. Which one of the following is not true?

a) Plant biologists estimate that 25-50% of all plant species are polyploids.

b) Most polyploid plants form by hybridization.

c) Most of the plants we grow for food are diploids.

d) Plant geneticists use chemicals to induce meiotic and mitotic errors to try to create new
hybrid plants with special qualities.

e) Bread wheat grown widely today is the result of several hybridization events.

34. Based upon experiments using fruit flies

a) reproductive barriers require hundreds or thousands of generations to evolve

b) new species can form in a single generation by the production of new reproductive
structures

c) reproductive barriers evolve slowly, usually as the result of many mutations

d) reproductive barriers may evolve as a consequence of a population's adaptive evolution to a new set of environmental conditions

e) reproductive barriers usually involve morphological changes that result from using structures in new ways in new environments

35. The process of speciation occurs

a) in a relatively short time

b) over extremely long periods of time

c) only rarely

d) once a generation

e) in both a relatively short time and over extremely long periods of time

36. Which of the following descriptions best represents the gradualist model of speciation?

a) An isolated population differentiates gradually from its parent stock as a result of the
accumulation of genetic-drift events.

b) An isolated population differentiates gradually from its parent stock as it adapts by
microevolution to its local environment.

c) Species evolve continuously in response to their changing environment, and most new
species represent an ancestral species that has changed enough to deserve a new name.

d) Two populations differentiate gradually from each other as gene flow between them is
constricted by the emergence of a geographical barrier.

e) Two populations differentiate gradually from each other as hybrids between them become progressively less viable and fertile.

37. The _____suggests that speciation occurs in spurts.

a) adaptive model of the origin of species

b) book of Genesis

c) theory put forth by Buffon

d) gradualist model of the origin of species

e) punctuated equilibrium model

38. Punctuated equilibrium differs from phyletic gradualism because in punctuated equilibrium

a) changes occur in a small subset of a large population of organisms, whereas phyletic
gradualism involves changes in a large population

b) phenotypic changes occur relatively rapidly in the populations undergoing speciation,
whereas phyletic gradualism assumes that phenotypic changes are gradual

c) once change has occurred, the newly developed species show relatively little change for
many years, whereas phyletic gradualism assumes that change would gradually continue

d) All of the choices are correct.

39. Most of the evidence from the fossil record supports the position that

a) evolution occurred in huge leaps and bounds

b) a gradual, steady accumulation of small changes occurred in evolution lineages

c) several kinds of prokaryotic cells led to the five kingdoms of life on Earth today

d) the first life forms arose shortly before the first oceans were formed

e) All of the choices are correct.

40. The emergence of a new plant species over a brief period of time would support which of the following theories?

a) the gradualist model

b) allopatric speciation

c) punctuated equilibrium

d) phylogenetic divergence

e) hybrid radiation

41. In their 30-year studies of Darwin's finches, the Grants have discovered that when the ground finch and cactus finch occasionally form hybrids, these hybrids

a) usually die before hatching

b) are unable to feed themselves and die soon after leaving the nest

c) can only survive during wet years when there are plenty of soft, small seeds

d) reproduce with the parent species, showing that ground finches and cactus finches are all
one species

e) are unable to produce a song and are therefore unable to find a mate

42. According to island biogeography, the farther an island is from the mainland, the

a) smaller the island

b) larger the island

c) fewer the number of endemic species

d) lower the rate of colonization

e) higher the rate of colonization

43. According to island biogeography, the larger an island, the

a) less the species richness

b) greater the species richness

c) less the diversity of available habitats

d) farther it is from the nearest mainland

e) closer it is to the nearest mainland

44. A plant with 12 chromosomes produces gametes with 12 chromosomes; if self-fertilization occurs the zygote would have _____chromosomes.

a) 3

b) 6

c) 9

d) 12

e) 24

45. What is the nature of the reproductive barrier between a mutant tetraploid plant and its original diploid parents?

a) mechanical

b) behavioral

c) postzygotic

d) habitat

e) geographic

46. Speciation as a result of genetic isolation without geographic isolation is referred to as

a) spontaneous generation

b) adaptive radiation

c) allopatric speciation

d) sympatric speciation

e) parapatric speciation