

Chapter 6: Population and Community Ecology

MULTIPLE CHOICE

1. The organisms that represent all of the different interacting species within an ecosystem make up
a
 - a. population
 - b. community
 - c. trophic level
 - d. biosphere
 - e. Genus
2. Which type of population distribution can enhance protection from predators?
 - a. Random distribution
 - b. Uniform distribution
 - c. Clumped distribution
 - d. Both a and c
 - e. None of the above are correct.
3. When individuals are found to be distributed evenly throughout an ecosystem it is often because
 - a. they form hierarchal social groups.
 - b. they are interbreeding
 - c. resources are not limiting
 - d. they mate for life
 - e. they are territorial.
4. Animals are sometimes randomly distributed across an ecosystem within a population because of
 - a. the tendency to form social groups.
 - b. the fact that the animals are territorial.
 - c. the fact that resources are not limiting.
 - d. repulsion by inhibitory pheromones.
 - e. All of the above
5. Which of the following is true?
 - a. Some populations grow without restraint as long as resources are not limiting.
 - b. The size of some populations tends to remain relatively constant over time.
 - c. In some populations size fluctuates in a cyclical pattern.
 - d. Population size may vary sporadically in response to environmental changes.
 - e. All of the above are true.
6. If a population of 100 birds increases to 120 birds the following year, $r =$ _____.
 - a. 0.16
 - b. 0.20
 - c. 1.2
 - d. 2
 - e. 20

7. A population of river otters has a growth rate of (r) of 0.2 per year. If the population starts out with 50 individuals and there is no migration, how many would you expect after one year; after two years?
- 10; 2
 - 52; 54
 - 60; 70
 - 60; 72
 - 70; 90
8. At the start of a study there were 200 spotted salamanders in an old-growth forest patch in western Oregon. Over the next year a biologist tracking the salamanders saw that 25 new salamanders hatched and 5 died. Thus r for this year was _____.
- 0.1
 - 5
 - 20
 - 25
 - 200
9. Which of the following is true?
- Under ideal conditions, bacteria and eagle populations both grow exponentially.
 - Populations of bacteria, which grow much faster than eagles, show exponential growth, whereas populations of eagles do not.
 - Because eagles grow to a larger size than bacteria, they have a J-shaped growth curve.
 - The growth curve of bacteria is never constrained by K .
 - Eagles are r -selected species while bacteria are usually K -selected species.
10. The intrinsic growth rate of a population
- directly affects environmental resistance.
 - causes changes in birth rates without affecting death rates.
 - causes changes in death rates without affecting birth rates.
 - is the maximum rate at which a population may increase.
 - all of the above
11. An ecosystem's carrying capacity for a population is determined by all of the following factors EXCEPT
- space.
 - energy.
 - water.
 - food.
 - climatic events, such as tornadoes.
12. A population of rabbits, introduced to an island, has rapid growth for a few years; then its growth slows. The population becomes stable because
- the carrying capacity has been reached.
 - environmental resistance declines.
 - immigration is reduced.
 - r declines.
 - Bergman's Principle takes effect.

13. Some predators feed preferentially on the most abundant prey. This type of predation is
 - a. density dependent.
 - b. density independent.
 - c. competitive.
 - d. exponential.
 - e. cyclical.
14. An exotic species is one which _____ an ecosystem
 - a. is rare in
 - b. is foreign to
 - c. does not interact with other species in
 - d. is the most dominant species in
 - e. destroys
15. Rapid growth may be temporarily be observed in a population in response to all of these EXCEPT
 - a. elimination of a pollutant.
 - b. elimination of predators.
 - c. increase in food supply.
 - d. introduction of a new parasite.
 - e. introduction into a new habitat.
16. During the winter of 1999, minimum temperatures did not get much below freezing in an Oregon pond, and the following summer large mosquito populations were observed. In the winter of 2000, frost came early, and most ponds froze for 3 months. In the following summer, very low mosquito populations were observed. This is an example of
 - a. density-independent regulation.
 - b. density-dependent regulation.
 - c. ecosystem carrying capacity.
 - d. community carrying capacity.
 - e. exotic regulation
17. A laboratory experiment followed the growth of a flour beetle (*Tribolium sp.*) population over time. At first the population increased dramatically but later growth slowed and the population size leveled off. While food (the wheat flour in which they live) was abundant, it was noticed that flour beetles resorted to eating their own eggs when densities got high. What can we conclude about cannibalism in this species?
 - a. It has no effect on the growth of the population, as food scarcity is clearly the limiting factor here.
 - b. It is clearly maladaptive as populations always do best when their densities rise as high as possible.
 - c. It serves as a density-dependent means of population control.
 - d. It serves as a density-independent means of population control.
 - e. We cannot reach any conclusion based on the information provided.
18. Populations of predators increase when populations of prey are high because
 - a. predators' nutrition is better.
 - b. it is easier to find prey.
 - c. the prey population may be weakened by competition for resources.
 - d. reproductive output may increase.
 - e. all of the above.

19. An important density-independent factor limiting population size is _____.
a. predation
b. weather
c. environmental resistance
d. competition
e. food quantity
20. Rabbits were introduced to Australia about 100 years ago for the purpose of hunting. They have been multiplying, eating up the native vegetation, and destroying the native habitat of other small animals, ever since. In the 1950's, in order to control the rabbit population, government scientists released the myxomatosis virus. The virus, which dramatically reduced the rabbit population, is an example of
a. a predator.
b. a parasite.
c. a cyclical pattern of growth.
d. the effect of migration on growth.
e. mixed use wildlife management.
21. When mosquitoes are very abundant, purple martins flock to the area and specialize on them. When mosquito populations are not large, purple martins are similarly scarce and feed on other insects. This is an example of
a. density-independent regulation.
b. density-dependent regulation
c. ecosystem carrying capacity.
d. community carrying capacity.
e. exotic regulation.
22. In his 1798 book, *An Essay on the Principle of Population*, Thomas Malthus stated "...the power of [the Earth's human] population [to increase] is indefinitely greater than the power in the earth to produce subsistence for man." He explained that our population increases exponentially while we can only increase our food supply linearly. Using our modern terminology, what did Malthus mean by "the power of the earth to produce subsistence for man?"
a. biotic potential
b. birth rate
c. carrying capacity
d. environmental resistance
e. growth rate
23. Most parasites have evolved to _____ their host.
a. kill
b. only weaken
c. have no effect on
d. strengthen
e. Not enough information to tell

24. The classic study of the number of lynx and snowshoe hares purchased from trappers by the Hudson Bay Company in northern Canada between 1845 and 1935 showed dramatic, closely linked population cycles of these predators and their prey. But this was not a carefully controlled scientific study. The results of this study could have been skewed because
- there was no control study to show whether the number of hares fluctuated even in the absence of lynx.
 - there may have been other predators for hares in the ecosystem other than lynx.
 - lynx might eat other small prey.
 - weather and other environmental conditions might have affected pelt collection.
 - all of the above
25. A study conducted in the laboratory used wasps as predators and bean weevils as prey. The wasps lay their eggs on weevil larvae, which provide food for the newly hatched wasps. What would be the most likely hypothesis for the outcome of this experiment?
- The prey population increased and decreased slightly later than the predator population.
 - The predator population increased and decreased slightly later than the prey population.
 - The two populations fluctuated synchronously.
 - The two populations fluctuated asynchronously
 - There was no correlation between the fluctuations in the two populations.
26. Which of the following is a density-independent event that could limit the size of a population?
- a mild winter, which reduces death rates
 - the accidental spill of a pesticide that causes the population to decrease
 - an increase in a predator population
 - the reduction of a competitor species
 - an outbreak of a parasite that spreads through close contact
27. Which of the following is NOT a type of interspecific interaction?
- symbiosis
 - predation
 - competition
 - speciation
 - mutualism
28. The biologist who studies interactions at the “community” level investigates interactions between
- organisms of one species
 - populations of more than one species.
 - animals of one species.
 - social animals (like insects).
 - ecosystems.
29. Predation is similar to _____ in that both types of relationship benefit one of the interacting species while the other is harmed.
- commensalism
 - competition
 - mutualism
 - parasitism
 - camouflage

30. If you were studying the niche of a species of bird, you might study
 - a. the food it eats.
 - b. its predators.
 - c. the temperatures it needs to survive.
 - d. the places where it builds its nests.
 - e. all of the above
31. Two species that have a high degree of niche overlap will
 - a. compete intensely.
 - b. speciate.
 - c. interbreed.
 - d. be a predator-prey pair.
 - e. coexist peacefully.
32. If similar species each occupy a smaller niche when they live together than they would if they lived alone, they are said to be
 - a. involved in succession.
 - b. partitioning resources.
 - c. coevolving.
 - d. increasing niche overlap.
 - e. engaging in mimicry.
33. Which of these outcomes is likely in a natural situation when two closely related species compete for resources in the same habitat?
 - a. Population size and distribution of each species may be reduced.
 - b. Interbreeding between the two species will occur.
 - c. One of the species will always become extinct.
 - d. Both species will become extinct.
 - e. Distribution and size of both populations will increase.
34. The concept that two species cannot occupy the same ecological niche is called
 - a. coevolution.
 - b. mutualism.
 - c. primary succession.
 - d. competitive exclusion.
 - e. commensalism.
35. Scientists visiting a remote island find two species of birds that appear nearly identical except for bill size. The species with the larger bill eats large seeds, and the species with the smaller bill eats small seeds. According to genetic evidence, the two species are extremely closely related to each other. Which of the following is the most likely explanation of the different bill sizes in these species?
 - a. Convergent Evolution has led to similar genetic fingerprints
 - b. natural and random variability between species
 - c. competition between the two species resulted in resource partitioning
 - d. mutations resulted in an inferior species with small, defective bills
 - e. the two species recently arrived on the island from distant continents, where their bill sizes had previously evolved in response to the types of foods they ate in their native lands.

36. When interspecific competition occurs between two species with similar niches,
- both species benefit from the interaction because each species expands its ecological niche.
 - both species are harmed because access to resources is reduced.
 - one species is harmed because only one species can expand its ecological niche.
 - neither species is harmed or benefits from the interaction.
 - There is not enough information to tell
37. Earthworms live in many grass and forest ecosystems, and aerate soil as they burrow. They ingest organic matter and travel between soil horizons. These traits, taken collectively, refer to the _____ of the earthworm.
- niche
 - habitat
 - community profile
 - ecosystem profile
 - resource partition profile
38. Two species of buttercup can be found in the same field in South Dakota. They emerge at different times: one species emerges and flowers in early spring, and the other species emerges in late summer, after the first species has set seed. Both flower species are pollinated by the same insect species, which is common in spring and summer. The different flowering times are likely due to
- competitive exclusion.
 - niche fragmentation.
 - niche realignment.
 - resource partitioning.
 - parasitism.
39. Two species of aster can be found in a field in New York, and they tend to flower at the same approximate time in early spring. When some ecology students decide to conduct an experiment in community dynamics, they selectively remove one species from the field by handpicking all plants of that species. When the one species is removed, the other species shows a significant increase in its population the next season. This study demonstrates
- competitive exclusion.
 - niche fragmentation.
 - niche realignment.
 - resource partitioning.
 - interspecific competition
40. On the slopes of the Carolina Appalachian Mountains, ecologists have studied some closely related plethodontid salamander species for decades. Many of these salamander species, when they occur in separate valleys from each other, tend to have very similar food size choices. However, when these species occur together in a mountain valley, their food choices tend to differ, with some species selecting small insects and others feeding exclusively on larger insects. This may be an example of
- competitive exclusion.
 - resource partitioning.
 - habitat fragmentation.
 - a mutualism.
 - a commensalism

41. In his 1961 paper, "The Paradox of the Plankton," ecologist G.E. Hutchinson noted that several species of algae coexist, sharing the same few mineral nutrient resources in homogeneous open water systems. As there is little chance of resource partitioning and niche differentiation in such a situation, the paradox of their coexistence is an apparent violation of
- Darwin's Theory of Evolution by means of Natural Selection.
 - the Climax Theory of Succession.
 - the Competitive Exclusion Principle.
 - the Law of Mass Action.
 - the Redfield Ratio.
42. Over the past century, sagebrush has dramatically expanded its range over the Colorado Plateau's grasslands. This has been attributed to the overgrazing of the area's grasses by cattle and sheep. This example indicates that
- grazing has no effect on the distribution of plants.
 - sagebrush could not exist anywhere in the absence of cattle and sheep.
 - sagebrush is the dominant competitor over grasses.
 - the range of sagebrush is normally limited by competition with grasses.
 - the relationship between sagebrush and grasses is mutualistic.
43. If an insect eats the lettuce seedlings in your yard, it is acting most like a(n)
- parasite.
 - host.
 - mutualist.
 - commensalist
 - herbivore.
44. If you find a brightly colored insect resting on a leaf, it is most likely to be
- poisonous or distasteful.
 - prey for birds.
 - camouflaged.
 - a parasite.
 - a young insect.
45. Which of the following statements BEST describes the reason why bright coloration is an effective defense against predators?
- The predators are color-blind and cannot see the prey.
 - The predators can see the color and, either through natural selection, (if the prey is toxic) or learning (if the prey is merely unpalatable), avoid the prey.
 - Predatory animals cannot learn anything; thus color is unimportant.
 - Symbiosis allows predators to coexist with prey so that neither goes extinct.
 - Commensal relationships such as this are the result of coevolution.
46. A species that is a mimic often
- secretes chemicals that deter predators.
 - behaves similarly to another species.
 - resembles their surroundings.
 - uses bright colors to warn that they are harmful.
 - produces defensive spines or thorns.

47. Which of these describes an effective means that prey species may use to evade predators?
- mimicry
 - warning coloration
 - chemical secretions
 - camouflage
 - all of the above
48. Which of these might a predator use to better enable it to catch its prey?
- startle coloration
 - warning coloration
 - camouflage
 - symbiosis
 - coevolution
49. Which behavioral response to the threat of predation is most likely to be selected for in a species that uses camouflage for protection?
- a quick escape response
 - a sudden display to startle the predator
 - a cooperative behavior
 - a behavior that mimics the behavior of the predator
 - a motionless behavior
50. Several species of harmless kingsnakes (*Lampropeltis spp*) mimic the color patterns of venomous coral snakes (*Micrurusfulvius*), which serve as models. If avoidance were based solely on prior predator experience with the model, what do you predict would happen in areas where coral snakes were never present?
- Predators would initially attack and eat kingsnakes but soon learn to avoid them.
 - Predators would attack and eat kingsnakes.
 - Predators would avoid kingsnakes.
 - Kingsnakes would evolve venom similar to the coral snakes.
 - No predictions can be made based on the information given.
51. Cucumber plants have evolved a number of chemicals to deter herbivorous insects. However, cucumber beetles have evolved ways to detoxify each new plant toxin as it has arisen. Which of the following statements can be deduced from this situation?
- Cucumber beetles are generalist herbivores, eating many different plants.
 - Cucumbers and cucumber beetles have not acted as agents of natural selection, driving each other's evolution.
 - Many different species of herbivorous insects will be able to feed on cucumbers.
 - Cucumber plants and cucumber beetles must be mutualistic.
 - Cucumber beetles have come to specialize on eating cucumber plants and will likely not eat many other species of plants.
52. A close interaction between two different species, in which one species benefits and the other is unaffected, is called
- mutualism.
 - commensalism.
 - parasitism.
 - mimicry
 - predation

53. The term “symbiosis” includes which of the following relationships between organisms of two different species?
- mutualism, predation, commensalism
 - mutualism, predation, parasitism
 - predation, commensalism, parasitism
 - mutualism, commensalism, parasitism
 - mutualism, commensalism, competition
54. Which of the following is NOT an example of two organisms in a mutualistic relationship?
- humans and the protozoa that cause malaria
 - flowering plants and their pollinators
 - cows and the bacteria in their guts
 - fungi and algae within a lichen
 - nitrogen-fixing bacteria and legume plants
55. Which of the following is NOT an example of two organisms in a parasitic relationship?
- a carnivorous plant and the insect it captures and digests
 - Human Immunodeficiency Virus (the AIDS virus) and an infected human
 - a lamprey eel and the fish whose blood it feeds on
 - a tapeworm and the goat whose digestive tract it lives in
 - a flea and the cat it feeds on
56. What characteristic best distinguishes predators from parasites?
- Predators feed on large prey, whereas parasites feed on small prey.
 - Parasites live on or within their prey.
 - Predators kill their hosts immediately, whereas parasites usually do not.
 - Parasites only attack primarily weakened or old organisms.
 - Parasites never kill their prey.
57. Tapeworms in the human gut are an example of
- predators.
 - parasites.
 - hosts.
 - commensalists.
 - prey.
58. Sap-feeding insects that feed on plants may be classified as
- predators.
 - parasites.
 - hosts.
 - commensalists.
 - prey.
59. Many plants have their roots infected with a specialized fungus. The plant supplies carbon to the fungus, and the fungus supplies nutrients to the plant. This is an example of a _____ association.
- mutualistic
 - commensalistic
 - parasitic
 - successional
 - predator/prey

60. A species that plays a major role in determining the structure of its ecological community is
 - a. a predator.
 - b. a dominator species.
 - c. the most abundant species in the community.
 - d. a keystone species.
 - e. the largest species.

61. The Black Rhinoceros is considered to be a keystone species because
 - a. removal of Rhinoceros from their community would result in drastic changes in the ecological structure of the community.
 - b. it is the largest organism in its community.
 - c. Rhinoceros live in large cooperative herds that dominate other smaller groups within the community.
 - d. Rhinoceros eat more food than any other species in their community.
 - e. Rhinoceros populations are larger than any other population of organisms in their community.

62. Ecologist Paul Ehrlich likened species in a community to rivets holding together an airplane. To paraphrase he implied that airplanes can lose some of their rivets with no ill effects, but may suffer catastrophic failures if one too many are lost. We could extend this analogy to state that some rivets are so crucial that they must be retained for the integrity of the airplane. These “crucial” rivets represent
 - a. climax species
 - b. keystone species
 - c. pioneer species
 - d. primary producers
 - e. top carnivores

63. A certain species of animal represents just 3% of the biomass in its ecosystem. We might classify this as a keystone species if its elimination
 - a. allowed an even rarer species to increase in numbers and take its place.
 - b. caused 2% of the other species in the community to disappear.
 - c. caused the diversity of the plant community to sharply decrease.
 - d. caused plant biomass to increase 3%.
 - e. had no effect on the community whatsoever.

64. When all vegetation is removed from a site by human activity or by natural forces such as volcanic activity, _____ species are the first to colonize the site.
 - a. prokaryotic
 - b. pioneer
 - c. climax
 - d. deciduous
 - e. eukaryotic

65. Which of the following is NOT true of the general pattern of succession, from a recently disturbed terrestrial site to stable, self-sustaining forest community?
 - a. A decrease in the number of grass species occurs.
 - b. Shade-loving tree species become dominant in the climax community.
 - c. Pioneer species give way to perennial, long-lived species.
 - d. Carbon that is involved in photosynthesis increases.
 - e. Total biomass tends to decrease.

66. _____ succession begins on bare rock after glaciers have passed, or on newly formed volcanic islands.
- Primary
 - Secondary
 - Climax
 - Pioneer
 - Not enough information to tell
67. The first plant community that forms on bare rock often includes organisms such as
- herbs and conifers.
 - grasses and weeds.
 - broad-leaf trees and conifers.
 - lichens and mosses
 - woody shrubs and conifers.
68. After a forested area such as a national forest is clear-cut, what type of succession occurs?
- primary
 - secondary
 - pioneer
 - climax
 - biome
69. Which of the following is NOT likely to characterize pioneer plant species involved in primary succession?
- able to tolerate intense sunlight
 - able to tolerate low nutrient levels
 - produces many small seeds that can travel great distances
 - slow-growing, long-lived perennial
 - small size