SAMPLE EXAM 3 FOR BIO213

Some of the material in this sample old exam may not have been covered for you.

Upon request from some students, answers are not highlighted. They will be provided and discussed on Wednesday discussions

1. Diffuse competition

(A) is the competitive effect of all members of a population on a particular individual

(B) results in equilibrium population densities lower than the carrying capacities

(C) is the competitive effect of all remaining species on the population of a particular species

(D) A & B

(E) B & C

2. Under which of the following conditions is the potential for interspecific competition expected to be very high?

(A) when communities are saturated

(B) when shared resources are scarce

(C) between ecologically similar species

(D) A & B

(E) all of the above

3. If both species in a Lotka-Volterra competitive system are capable of driving each to extinction, which of the following is true?

(A) Stable coexistence is possible

(B) An unstable joint equilibrium can result

(C) Neither species can exclude the other

(D) The carrying capacities of both species will have to be identical

(E) Both species will necessarily have identical population densities

4. Which of the following best illustrates the competitive exclusion principle?

(A) In the absence of cover ("heterogenous medium") Didinium protozoans drove Paramecium extinct and then starved to death.

(B) Balanus barnacles in the system studied by Connell were not able to colonize the upper range of the intertidal occupied by Chthamalus

(C) Introduction of the English sparrow and starling caused many endemic birds of Hawaii to go extinct

(D) B & C

(E) All of the above

5. When would you expect a population to colonize marginal (poor in quality) habitats?

(A) When interspecific competition is low

(B) At high densities

(C) When intraspecific competition is high

(D) A & B

(E) B & C

6. Interspecific competition can be reduced by

(A) Specialization on the part of individual species

(B) Resource partitioning

(C) Character displacement

(D) Switching to alternate resources

(E) All of these

Questions 7-10. In a two-species Lotka-Volterra type competition model, Species 2 can maintain Species 1 at an equilibrium population density of 400 (per unit area), while it is also in equilibrium at the same density. K1= 450, K2 = 500.

7. What can you say about the competition coefficients?

(A) a1,2 = 1/8, a2, 1 = 1/2

(B) a1,2 = 1/2, a2,1 = 1/2

(C) a1,2 = 1/4, a2,1 = 1/2

(d) a1,2 = 1/8. a2,1 = 1/4

(E) a1,2 = 1/4, a2,1 = 1/8

8. How high must the density of Species 2 be in order to make Species 1 go extinct? (answers in individuals per unit area)

(A) 3000

(B) 7600

(C) 3500

(D) 3600

(E) 7200

9. What can you say about the equilibrium?

(A) Stable joint equilibrium

(B) Unstable joint equilibrium

(C) Species 1 will eventually exclude Species 2

(D) Species 2 will eventually exclude Species 1

(E) Cannot say anything

10. In the absence of Species 2, which of the following quantities will change for Species 1?

(A) r1

(B) N*1

(C) K1

(D) B & C

(E) All of the above

11. The entire set of optimal conditions under which a species can live and replace itself

(A) is the fundamental niche

(B) is reduced by competition and predation

(C) is a subset of the realized niche

(D) A & B

(E) B & C

12. Non-overlapping niches can be a consequence of

(A) Ecological specialization

(B) High interspecific competition

(C) Efficient resource partitioning

(D) A & B

(E) All the above

13. Which of the following statements is false?

(A) Species that overlap in food and habitat use can reduce interspecific competition by foraging at different times of the day

(B) Diffuse competition increases with niche dimensionality

(C) Interspecific competition tends to increase niche breadth while intraspecific competition tends to decrease it

(D) K-strategists would likely be keener competitors than r-strategists

(E) Species in unstable environments with fluctuating resource availabilities tend to have broad niche breadths

14. Why is it that no more that 5 to 6 trophic levels can occur in a community?

(A) There would not be enough physical space for more than 5-6 trophic levels

(B) Energy transfer through trophic levels is inefficient

(C) Energy cycles are two slow to allow more than 5-6 trophic levels to occur in the same community at the same time

(D) Community matrices will be unstable if there were more levels

(E) All the above

15. When Australians introduced the myxoma virus to control rabbit populations in their country they found that

(A) Rabbits were not affected by the virus at all

(B) The virus evolved to become less virulent to the rabbits

(C) The rabbits evolved to become more resistant to the host

(D) B & C

(E) None of the above is true

16. Which of the following is most likely to develop a search image?

(A) A specialist predator

(B) A generalist predator

(C) An inefficient predator

(D) A competitive species

(E) A sedentary predator

17. Which of the following is most likely to decrease the growth rate of a hypothetical prey species that can grow exponentially in an infinite environment?

(A) Increase in predator population density

(B)Self-damping density effects

(C) Increase in harvesting efficiency of predators

(D) B & C

(E) A & C

18. Some predator species respond to 'pulses' of increased prey densities by increasing their per-capita intake of prey.

(A) This is termed "functional" response

(B) This can be caused by the fact that at higher densities prey may be easier to catch

(C) This can be the result of greater efficiency of conversion of consumed prey into predator numbers

(D) A & B

(E) A & C

19. With an overly efficient predator and a prey that exhibits density-dependent population growth, what kind of dynamics is possible?

(A) Neutrally stable oscillations

(B) Unstable limit cycles

(C) Damped oscillations

(D) Either A or B

(E) Either B or C

20. Which of the following best counters the group-selectionist view of "prudent predation" ?

(A)Predators do often catch old and weak prey

(B) Predators that cheated would have greater fitness and would be selected for, thereby the "selfish" gene would spread

(C) Old prey individuals with no/low residual reproductive values are easy to catch

(D) Humans play the role of prudent predators in wildlife/fisheries management

(E) All of these

21. In a lab experiment with mites and oranges, Huffaker (1958) found that placing the oranges at distances apart and introducing barriers to dispersal, allowed population cycles of a predatory mite and a prey mite that fed on the oranges to persist for a longer time. This experiment suggests that

(A)Predators can allow for coexistence among competitors

(B) Habitat complexity can stabilize predator-prey interactions

(C) The prey mites were capable of exponential population growth

(D) Predator removal experiments are of limited use

(E) A, B & C

22. Which of the following is not an example of cryptic coloration?

(A) Environmentally-induced green and brown polymorphisms in southern grasshoppers

(B) Industrial melanism in Biston moths in England

(C) Shell color polymorphisms in European land snails that are preyed upon by song

thrushes

(D) The red-yellow-black banding in coral snakes

(E) A, B & C

23. Which of the following is not likely to be true about Mullerian mimicry between two species?

(A) Color polymorphisms are common in these

(B) Both species are aposematically colored

(C) This is a form of predator avoidance

(D) Both can be equally abundant

(E) Both species are distasteful

24. Parasite-host interactions can

(A) Decrease host fitness

(B) Result in alteration of host behavior

(C) Be used in biological pest control

(D) Induce immune response in hosts

(E) All of the above

25. Selective pressures from herbivory may not be responsible for

(A) Evolution of "mast fruiting" behavior and fruit crop failures

(B) Evolution of Batesian mimicry among herbivores

(C) Low seedling and sapling densities around parent trees in tropical forests

(D) Mutualisms between swollen-thorn acacias and ants

(E) Production of complex plant secondary substances

26. Apparent plants are not

(A) Early successional species

(B) Slow-growing and competitive

(C) Common

(D) Woody perennials

(E) Producing tannins and other expensive quantitative defenses

27. Which of the following examples represent(s) facultative mutualisms?

(A) Termites and the endosymbiotic protozoa in their gut

(B) Species-specific interactions between plants and their pollinating vectors

(C) Water buffalo and cattle egrets that rid them of ectoparasites

(D) A & B

(E) B & C

28. An interaction between two species, say A and C, wherein A competes with B and B competes with C:

(A) Suggests competitive mutualism

(B) Occurs within a trophic level

(C) A & B

(D) Is an example of indirect competition

E) All the above

29. Which of the following macrodescriptors may not be used to describe community processes?

(A) Energy flow rates

(B) Connectance

(C) Diversity

(D) Stability

(E) Natural selection

30. A subset of a community that includes species utilizing a common resource in a functionally similar manner is a

(A) Niche

(B) Guild

(C) Family group

(D) Population

(E) Hypervolume

31. Top predators in terrestrial ecosystems would be found at the apex of

(A) Pyramids of biomass

(B) Food webs

(C) Pyramids of energy

(D) Pyramids of numbers

(E) All of the above

32. Which of the following "pyramids" may actually be inverted in aquatic ecosystems?

(A) Biomass

(B) Numbers

(C) Energy

(D) A & B

(E) All of the above

Questions 33-35 are based on an alpha matrix of a simple community

(Note: In this matrix, only direct interactions are represented)

	P	Q	R	S	<=species having the effect
Species affected =>	P	1	+	-	0
Q	+	1	+	-	
R	+	0	1	0	
S	0	+	0	1	

33. Which pair of species is most likely to be at the same trophic level?

(A) P & Q

(B) P & R

(C) R & Q

(D) Q & S

(E) P & S

34. The interaction between P and R can be that of

(A) Host-parasite

(B) Predator-prey

(C) Commensal

(D) A & B

(E) B & C

35. Many (off-diagonal) zero elements in matrices such as these may indicate

(A) Fewer species

(B) Fewer direct inter-specific interactions

(C) Low connectance in the community as a whole

(D) B & C

(E) All of the above

36. In the discussion of the relationship between diversity and stability of biological communities, what measure of stability did Robert May use?

(A) Constancy

(B) Resilience

(C) Cyclic stability

(D) Trajectory stability

(E) Resistance

37. The suggestion that complex communities are more stable than simple ones is supported by

(A) The observation that highly simplified systems, such as in agriculture, are more likely to collapse because of perturbations than complex ones

(B) The reasoning that communities with many trophic levels provide greater buffering capacity "checks and balances" among populations of various species

(C) The finding that generalist insect species in some cases have less stable populations than those with more restricted diets

(D) A & B

(E) All the above

38. Earlier in this course you learnt about biomes of the world such as tropical and temperate deciduous forests, grasslands, chaparral etc. What concept from community ecology would you use to describe these biomes?

(A) Guilds

(B) Trophic levels

(C) Climax communities

(D) Secondary succession

(E) None of these

39. The horned lizard Phrynosoma appears to occupy the same niche in American deserts that the agamid lizard Moloch does in Australian deserts. What would you call this pair of species?

(A) Ecological equivalents

(B) Sympatric

(C) Closely related

(D) Competitors

(E) None of the above

40. Which of the following examples would support the intermediate-disturbance hypothesis for species diversity?

(A)Pisaster starfish removal experiments reduced the diversity of sessile intertidal invertebrates.

(B) Periodic fires in the Australian desert allow several species of lizards to coexist

(C) Species in tropics are more specialized and closely packed, making for greater diversity.

(D) A& B

(E) All the above

Questions 41-45. Match the following :

(A) G.E. Hutchinson

(B) R.H MacArthur

(C) R.T. Paine

(D) G.F Gause

(E) H.S. Horn

41. Lab experiments of competition and predation

(A) (B) (C) (D) (E)

42. Field experiments of predator removal

(A) (B) (C) (D) (E)

43. Succession in northeastern US forests

(A) (B) (C) (D) (E)

44. Hypervolume concept of niche

(A) (B) (C) (D) (E)

45. Resource partitioning in warblers

(A) (B) (C) (D) (E)

46. The transition zone (ecotone) between two adjacent communities within a region is often one of high species diversity, with many "edge" species including those from both communities. The component of diversity referred to here is

(A) Within-habitat (Alpha) diversity

(B) Between-habitat (Beta) diversity

(C) Regional (Gamma) diversity

(D) A & B

(E) All the above

47. Intense seed predation has been proposed as one of the mechanisms accounting for high tree species diversity in the tropics. According to this, seed predators allow conspecifics (individuals of a single species) to be spaced evenly in the forest, allowing coexistence of many species of trees.

For this hypothesis to be supported, we would have first to show that

(A) Temperate forest trees compete less with one another for space

(B) Trees in the tropics are spaced more uniformly than temperate trees

(C) Seed predators in the tropics are more specialized than in the temperate zone

(D) Most of the seeds are in fact scattered below and around the parent tree

(E) Outside the immediate vicinity of the tree, saplings can better escape predation

48. The terms on the left column are popularly used by environmentalists in various contexts. Associate these terms with concepts you have learnt from your study of evolutionary ecology.

(p) Population explosion (v) Regional ("gamma") diversity
(q) Fisheries management (w) Plant-herbivore interactions
(r) Biological control of weeds (x) Community stability
(s) Tropical conservation (y) Exponential growth
(t) Balance of nature (z) Prudent predation

(A) p-v, q-w, r-x, s-y, t-z

(B) p -z, q-y, r-x, s-w, t-v

(C) p -y, q- z, r-w, s-v, t-x

(D) p-y, q-w, r-z, s-x, t-v

(E) p-y, q -z, r -x, s-w, t-v

49. Species richness on islands is likely to increase with all the following except

(A) Size of island

(B) Proximity to mainland

(C) Habitat diversity on the island

(D) Opportunities for evolutionary diversification

(E) Turnover rates

50. Habitat fragmentation caused by humans results in formerly extensive areas of natural ecosystems being "cut up" into small patches. Not only does this decrease the available amount of habitat, but it also causes degradation: i.e; reduction in the quality of habitat in terms of feeding and breeding sites.

Which species would you expect to disappear first from fragmented habitats?

(A) Habitat generalists

(B) Habitat specialists

(C) "Edge" species

(D) A & C

(E) B & C