

EXAM 2

ECOLOGY (BIO 310)
Dr. McEwan

NAME _____

On the bubble sheet fill in your NAME, your STUDENT number, and then enter the correct bubble on the Scantron sheet for each question as is customary. Good Luck

INTRASPECIFIC POPULATION REGULATION

Hey let's talk about Whooping Cranes!

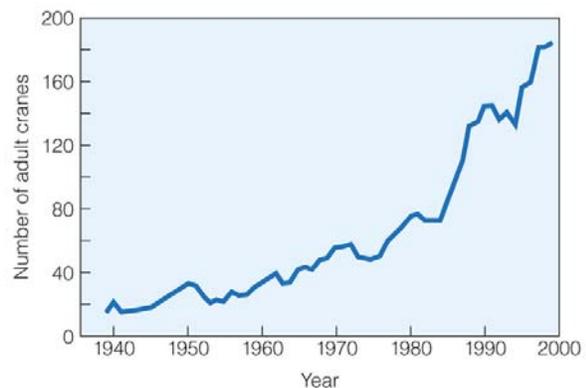
Take a look that handsome bird to the right. This species was seriously endangered and then made a remarkable recovery. Take a look at the graph.



(a)

1. What does this graph suggest about the ecological conditions facing this species following the start of restoration efforts:

- (a) predation is mediating the population's approach to Carrying Capacity
- (b) high levels of intraspecific competition & limited resources
- (c) low levels of intraspecific competition & plentiful resources.
- (d) predation is not a significant factor
- (e) c & d



(b)

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2. Based on the conversation in class. There was one particular thing limiting restoration efforts once they began. What was that:

- (a) the invasive Curry's crane is limiting habitat availability for other species
- (b) predatory activity of various species (weasels, foxes & coyotes)
- (c) loss of gregarious behavior (in this case, parents training the young) due to low population numbers
- (d) a & b
- (e) none of these



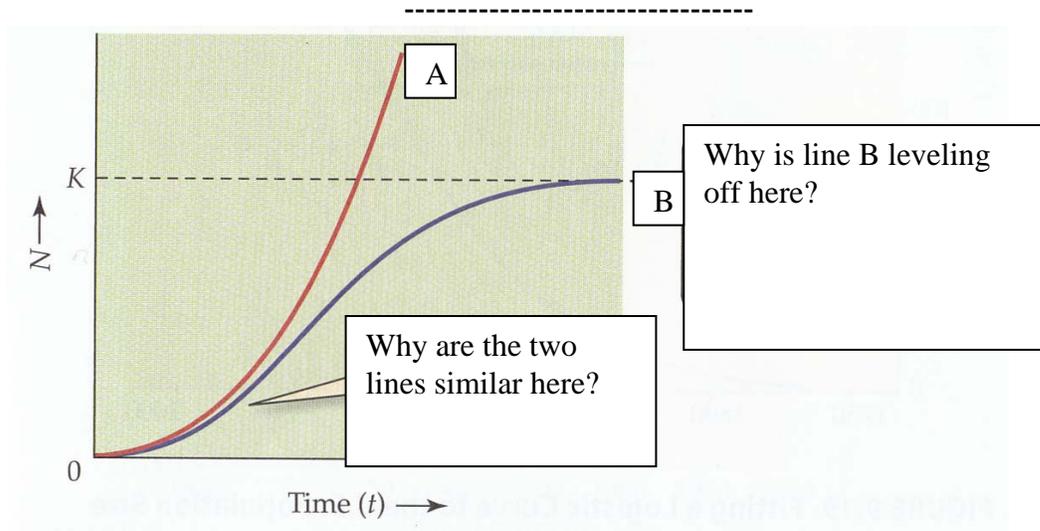
Above is an image of an insect that you should know about from class...

3. This species is present on the campus of the University of Dayton
 - (a) true
 - (b) false

4. This species is going through a population expansion that would be described as “logistic” in terms of population models.
 - (a) true
 - (b) false

5. Why is this species population expanding so rapidly?
 - (a) natural enemies have been eradicated by careless use of insecticide
 - (b) global warming is changing forests
 - (c) land-use change has created new opportunities
 - (d) it is an exotic insect able to feast on trees here in the US that are not adapted to it
 - (e) none of these

6. Within a particular area, for example, Detroit, Michigan, the **long-term** trend for this species is likely to be:
 - (a) large populations into the foreseeable future
 - (b) population “bust” results in massive decline as food source is lost



This is a figure from the discussion in class. It depicts population growth of organisms under contrasting assumptions. The lines A and B reflect those contrasting assumptions. In this figure, there is no consideration given to the activity of other species (e.g., this does not consider predation or interspecific competition).

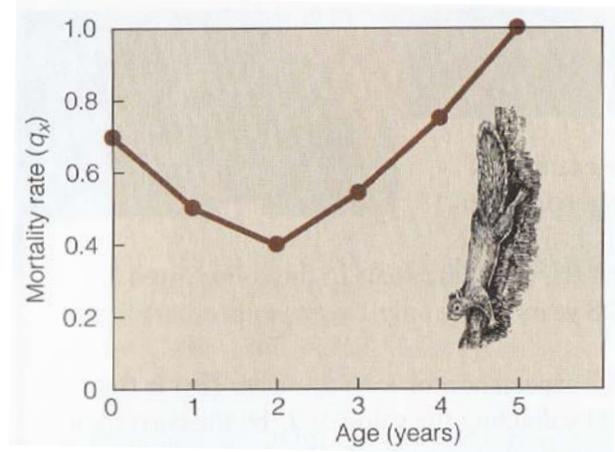
7. A plausible, and theoretically sound, explanation of why is B leveling off would be:

- a) the population has arrived at Carrying Capacity (K)
- b) the population growth is unlimited because of resources.
- c) the population has arrived at a resource threshold.
- d) b & c
- e) a & c

8. A plausible, and theoretically sound, explanation of why the two lines are similar at the point indicated on the figure would be:

- a) at that time point, the number of individuals is too great for the lines to separate.
- b) at that time point, predation factors overwhelm population growth
- c) at that time point, the two populations experience abundant resources, the activity associated with population limitation is not yet important.

9. For the moment, let's imagine that this figure represents an endangered species that you have been hired to manage. You can breed the little beauty at your facility; however, you need to know WHEN to release it into the environment. If you wanted to **minimize mortality** in the field for each individual, which would you do:



- a) release individuals immediately after birth
- b) release at 1 year
- c) release at 2 years
- d) release at 3 years
- e) release at 4 years or later.

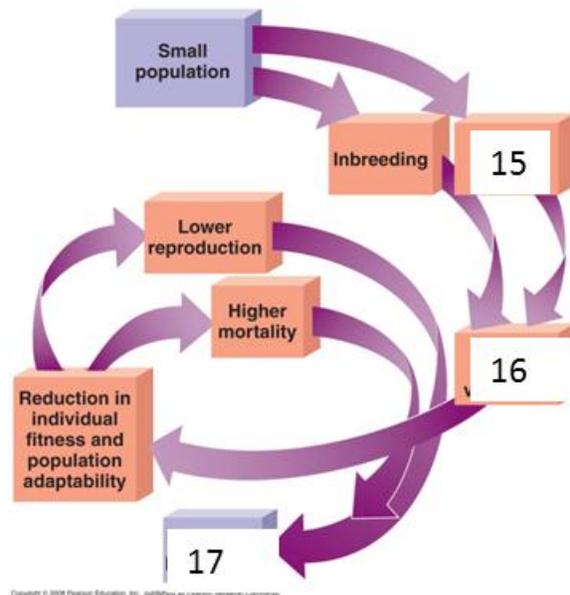
For the following list, choose whether you expect the organism to have a survivorship curve described as

- a) Type I ; b) Type II; c) Type III

- 10. oak tree
- 11. killer whale
- 12. human
- 13. bird
- 14. fish

Fill in the boxes on the extinction vortex:

- a) Demographic stochasticity
- b) Loss of Genetic Diversity
- c) Smaller Population
- d) Genetic Drift
- e) none of these



SPECIES INTERACTIONS

For the following, identify whether the relationship is:

(a) Commensalism; (b) Parasitism; (c) Mutualism; (d) Amensalism; (e) Competition

18. Zika virus

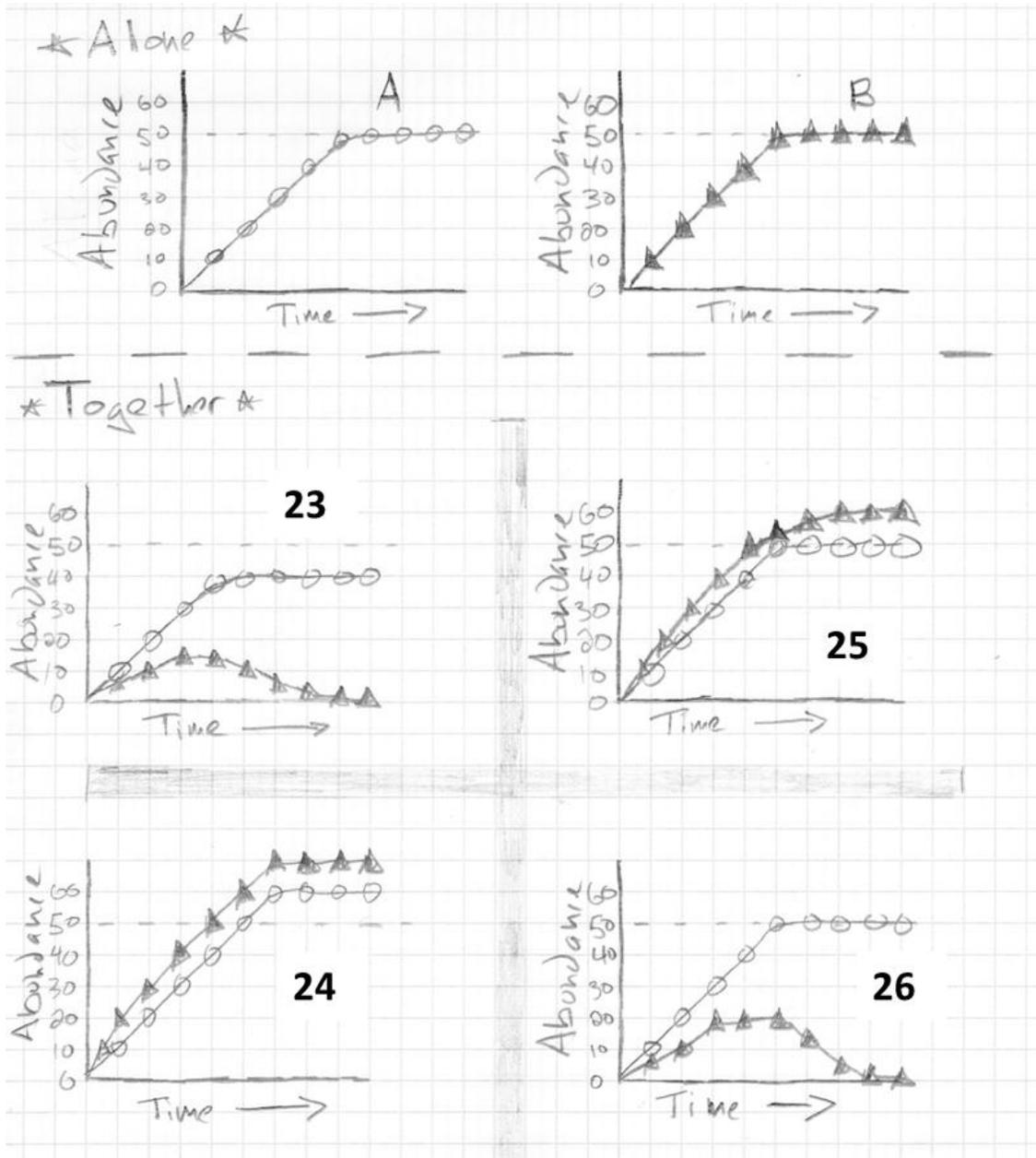
19. - o

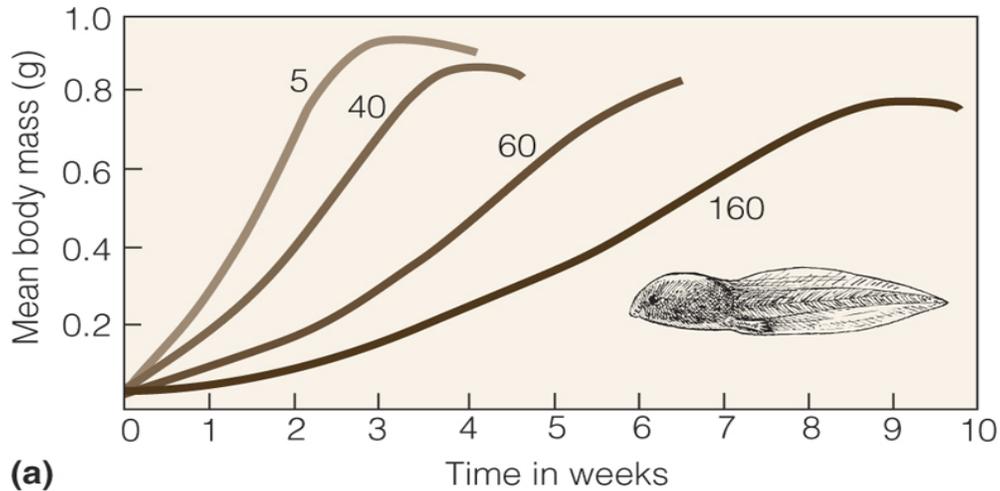
20. +, o

21. Ants on acacia trees

22. -, -

Interpret the figure below for 23, 24, 25, 26.





Interpret this figure from class, and also from your book, and answer the questions below. This depicts the results of a study where the number of tadpoles within a particular habitat (finite resources) were experimentally varied. Note that the numbers next to the lines are the numbers of individuals in each treatment.

27. As the number of tadpoles in the habitat increases, the mean body size at week three:

- (a) increases
- (b) decreases
- (c) cannot tell from this diagram

28. This figure indicates that:

- (a) access to resources decreases as population size decreases
- (b) access to resources decreases as population size increases
- (c) access to resources is not effected by population size

29. This figure provides support for:

- (a) density-dependent population regulation
- (b) density-independent population regulation
- (c) neither of these
- (d) both of these

 30. Which is not a prediction of the Lotka-Volterra model of competition between two species X and Y?

- (a) X wins
- (b) Y wins
- (c) X or Y may win, depending on initial density of each
- (d) all of these are predictions.

Interpret this figure from class and your book:

31. In the top panel, the line that falls from high to low is Si- the species in competition with Af

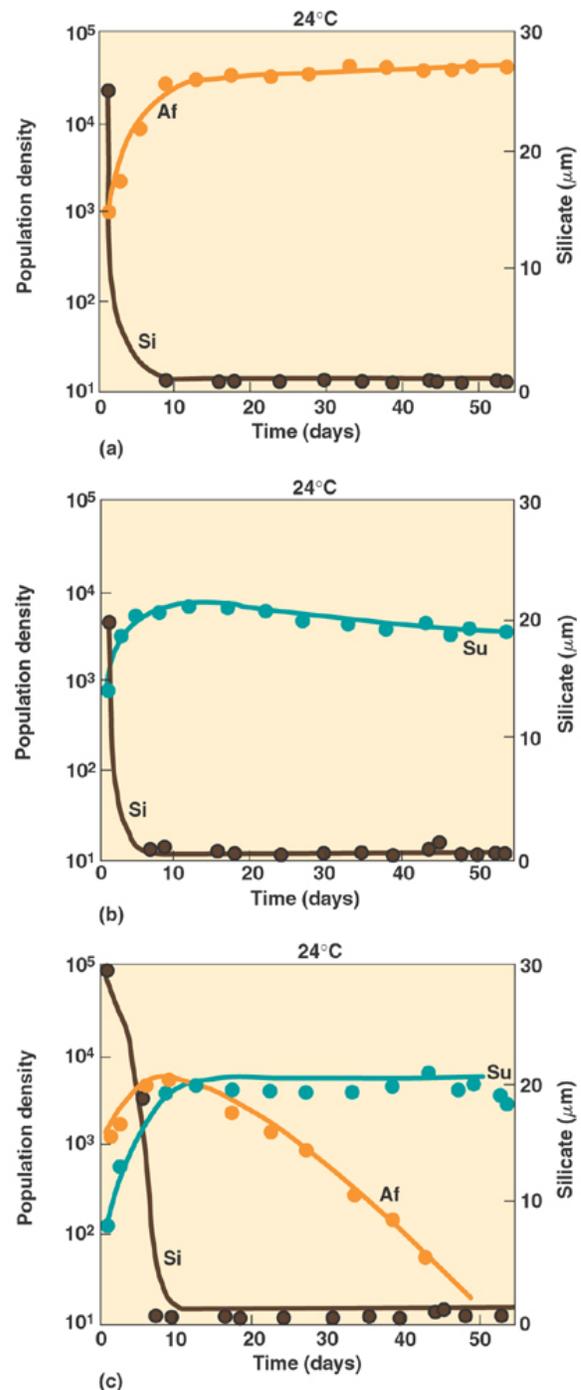
- (a) true
- (b) false

32. In the top and middle panels, the lines that increase and level off give the impression of:

- (a) population regulation associated with unlimited resources.
- (b) exponential growth
- (c) population regulation associated with limited resources
- (d) predator-mediated population decline
- (e) c & d

33. In the bottom panel, the line Af drops from high to low through time. That is because:

- (a) competition with Si
- (b) Si is commensal with Su, but not Af
- (c) Si is a pathogen of Af but not Su
- (d) Si is a mutualist with Su, but not Af
- (e) none of these



34. GE Hutchinson's "Paradox of the Plankton" expresses the question:
- (a) why are there so few plankton species given abundant aquatic resources
 - (b) why are there so many plankton species when they appear to compete for the same resources.
 - (c) why are plankton species so rapidly declining when there is no evidence of competition.
 - (d) a & c
 - (e) none of these

Regarding the figure on the right, which was discussed in class: (a) true, (b) false

35. The predator is choosing prey in a way that mirrors the mean distribution of body size in the habitat.

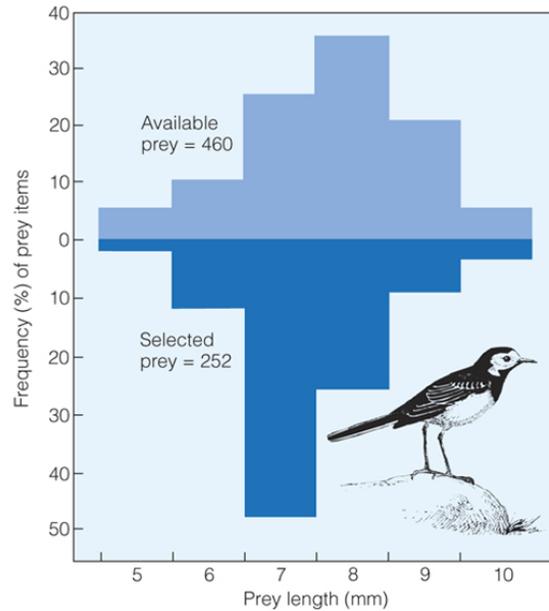
36. The predator is choosing prey based on energy efficiency of the process.

37. The factor that most strongly dictates food selection in the figure is:

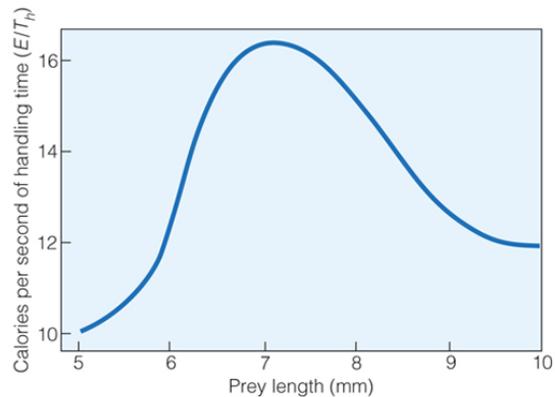
- a) Prey item coloration
- b) Prey item length
- c) a & b
- d) Calories/Second Handling Time

38. The term for the selection of prey (food) items in this fashion:

- a) Forage based- artificial selection
- b) Forage-dependent feeding hypothesis
- c) Optimal-foraging theory
- d) Trait-trait interaction
- e) None of these



(a)



(b)

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39. Because of their hollow bones and sharp, hard, beaks, this theory (from Question 38) only applies to birds and no other animals:

- (a) true
- (b) false

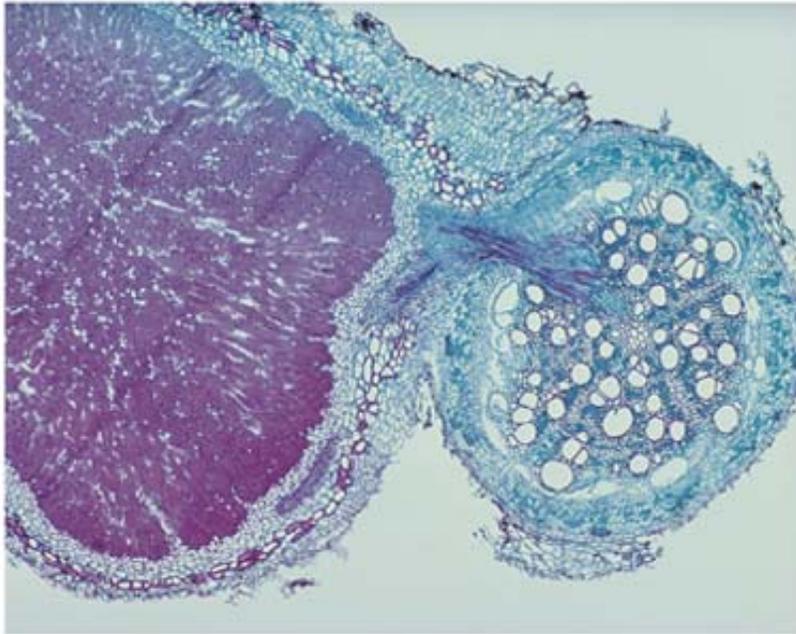
40. Which of the following is an example of cryptic coloration?
- (a) a brown bird that nests in bright green reeds
 - (b) a deer with a large, white tail
 - (c) green spider on a green leaf
 - (d)



Concept Matching. Match each concept below

- 41. A mutualistic relationship between a bacteria and a plant.
- 42. A mutualistic relationship between a fungi and a plant.
- 43. Increases plants ability to forage for water and nutrients
- 44.

- (a) rhizobium
- (b) mycorrhizae





This *Brilliant Scientist* wishes you good luck
on the rest of the exam!

Community Concept

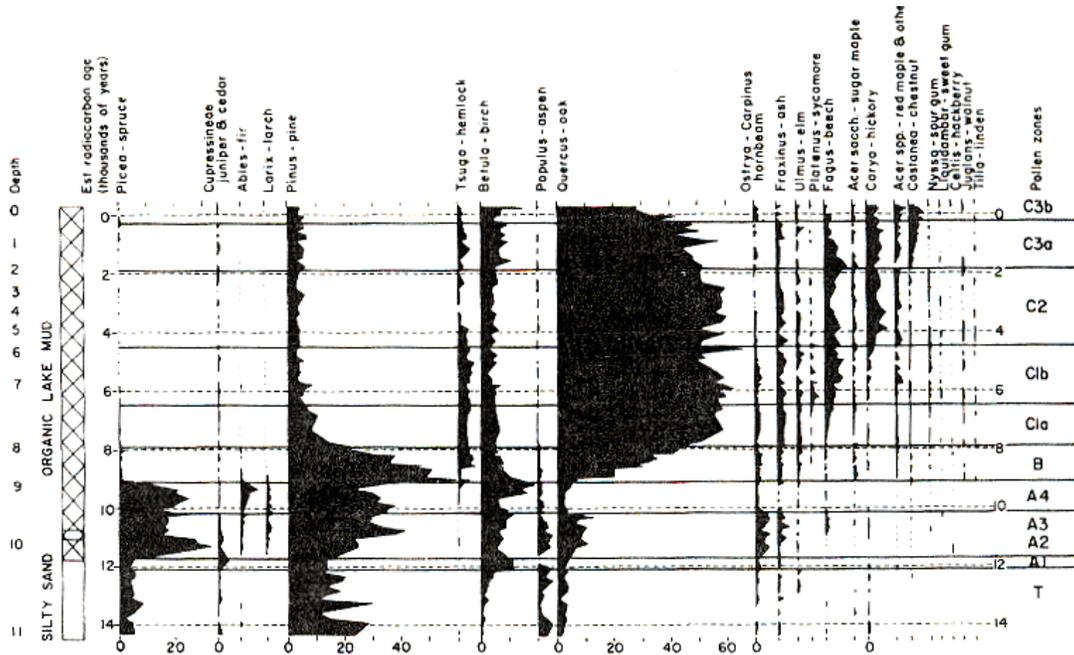


FIG. 4. Percentages for tree pollen types, calculated as percent total pollen from terrestrial plants, plotted against the absolute age of the sediment.

For the following questions refer to the figure above, which was discussed at length in class.

True (a) or False (b)

45. The oldest records are near the top of the diagram, newer records at the bottom.
46. This figure demonstrates that ecological communities change over the long-term.
47. One implication of this figure is support for Henry Gleason's view of communities.
48. This figure provides evidence of oak forests changing to pine-spruce over the long-term

For the following statements regarding the organization of communities match either:

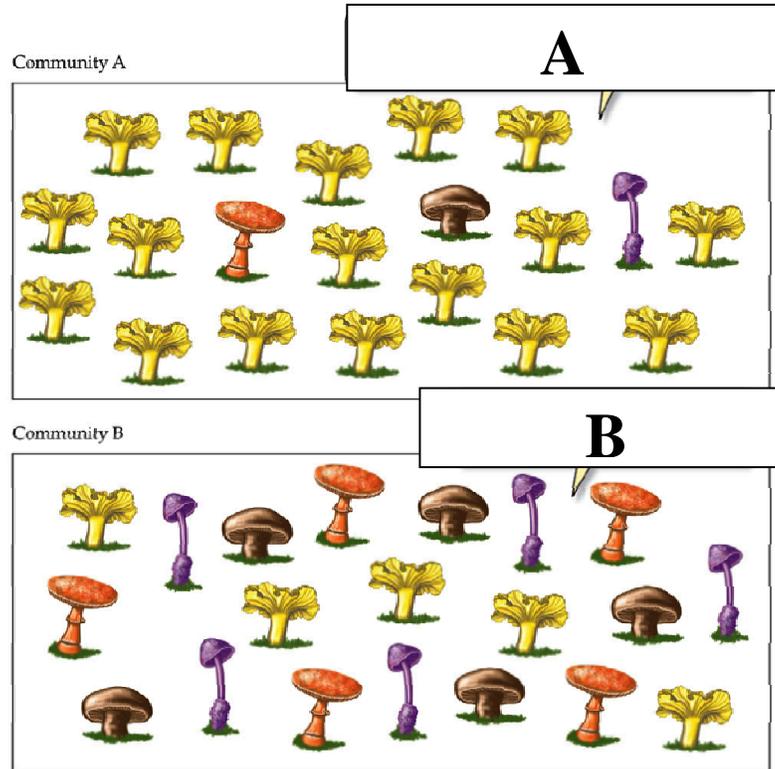
- a) matches the Gleason theory
 - b) matches the Clements theory
 - c) does not apply to either the view of either Gleason or Clements
49. communities are superorganisms
 50. "It can be confidently affirmed that stabilization is the universal principle of all vegetation".
 51. communities are made up of species that are arrayed based strictly upon individualistic environmental needs

Given these two communities of mushrooms (below):

(a) Community 1; (b) Community 2 ; (c) Equal ; (d) Unable to discern

52. Greatest species richness

53. Highest diversity



54. Diversity and richness are equivalent from the perspective of the total ecology of an ecosystem

- (a) true
- (b) false

$$H' = - \sum_{i=1}^s p_i \ln p_i$$

For the next set of questions, refer to this equation:

(a) true; (b) false

55. This equation measures species richness

56. In this equation, the dominance of each species is incorporated in the p_i terms

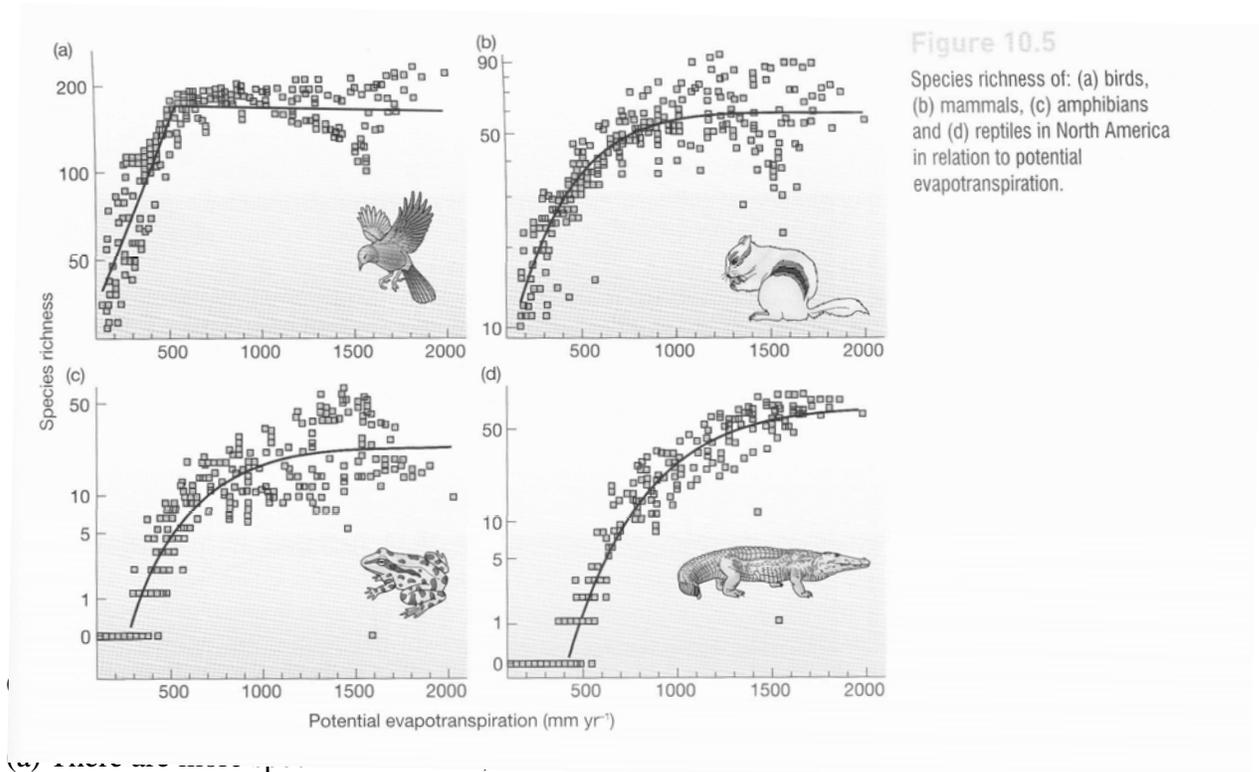
57. The summation sign indicates the usefulness of this index for summing across different forest types.

58. According to recent estimates how many species are there on Earth that have been currently identified (named)?

- (a) 20,000
- (b) 200,000
- (c) 2,000,000
- (c) 20,000,000

59. Most of these species are:

- (a) fish
- (b) plants
- (c) mussels
- (d) fungi
- (e) none of these.



(b) There are fewer species in warmer, wetter locations

61. The Switzer-Aikman hypothesis is a pathogen-based theory that may explain the pattern reflected in the figures above.

- (a) True
- (b) False

62. Which is the final filter that is considered to operate on the Regional Species Pool as predicted by “assembly rules”

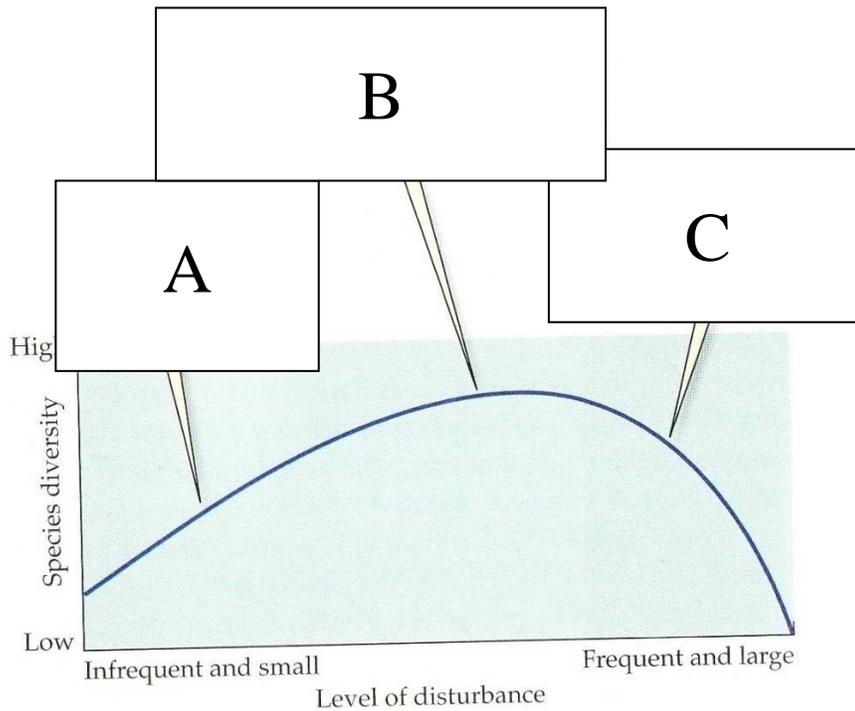
- (a) Abiotic Factors
- (b) Dispersal
- (c) Species Interactions
- (d) *Hutchinsonian* competition
- (e) *Jeffersonian* competition

63. An example of an Abiotic filter would be:

- (a) allelopathy
- (b) herbivory
- (c) temperature
- (d) stochastic disturbance
- (e) predation

64. In almost any ecosystem, as you increase the area of sampling, the number of species encountered will _____.

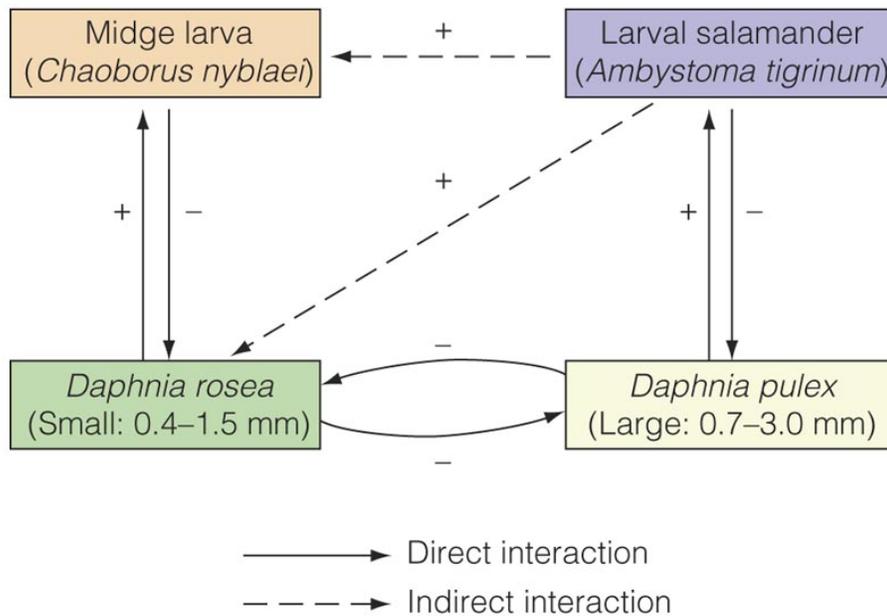
- (a) decrease
- (b) remain the same
- (c) increase



Answer the following questions for the figure above

65. At point _____ competition is limiting the diversity of the system

66. At point _____ tolerance to harsh conditions is limiting the diversity of the system



Concerning this figure discussed at length in class:

- (a) true,
- (b) false

- 67. The larval salamander is a predator of the *Daphnia rosea*.
- 68. The presence of salamander increases the numbers of midge larvae.
- 69. The salamander eggs are consumed by BOTH *Daphnia* species
- 70. In competition, with no predators, the *Daphnia* will come to Lotka-Volterra equilibrium (meaning both will persist).

Ecological Catechisms of Dune

Identify each statement as either - (a) yes it is, or (b) no it is not- one of the Catechisms

- 71. “Rain in the desert brings diversity multiplied”
- 72. “The more life there is within a system, the more niches there are for life”
- 73. “Life improves the capacity of the environment to sustain life”
- 74. “Desert dryness is a lever for the generation of sustainability”
- 75. “Life makes nutrients more readily available.”
- 76. Thinking Like a Mountain means recognizing the benefits of humans killing predators to create purity of mountain streams. (a) true, (b) false.
- 77. In Thinking Like a Mountain, Leopold relays his profound experience in killing deer, which over populate mountains. (a) true, (b) false.

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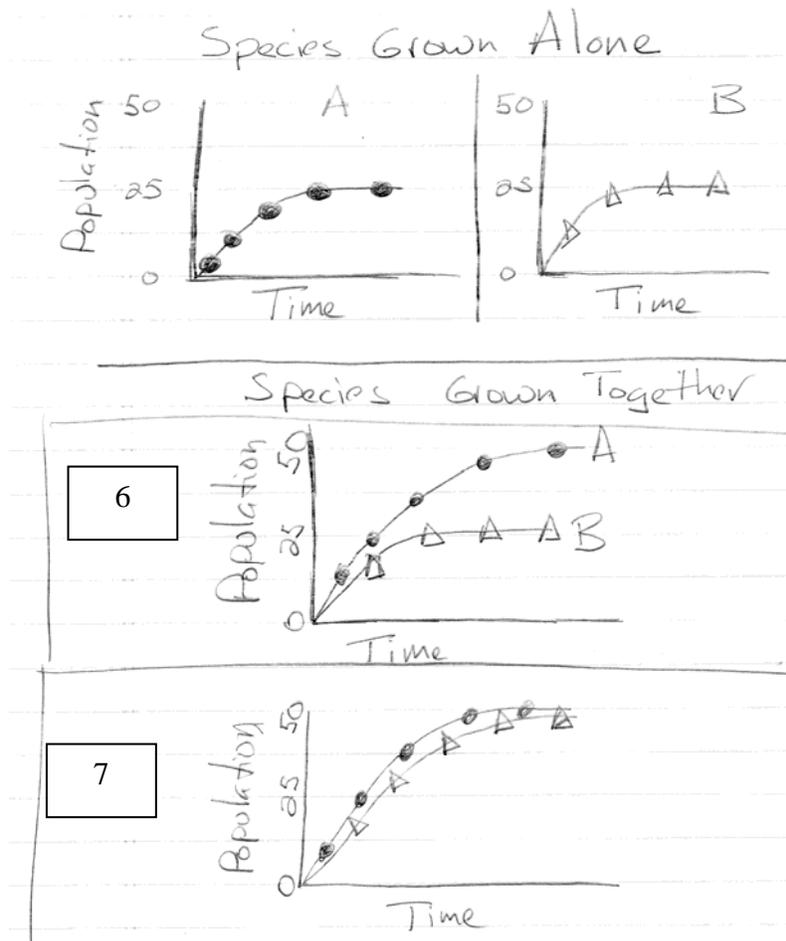
SPECIES INTERACTIONS

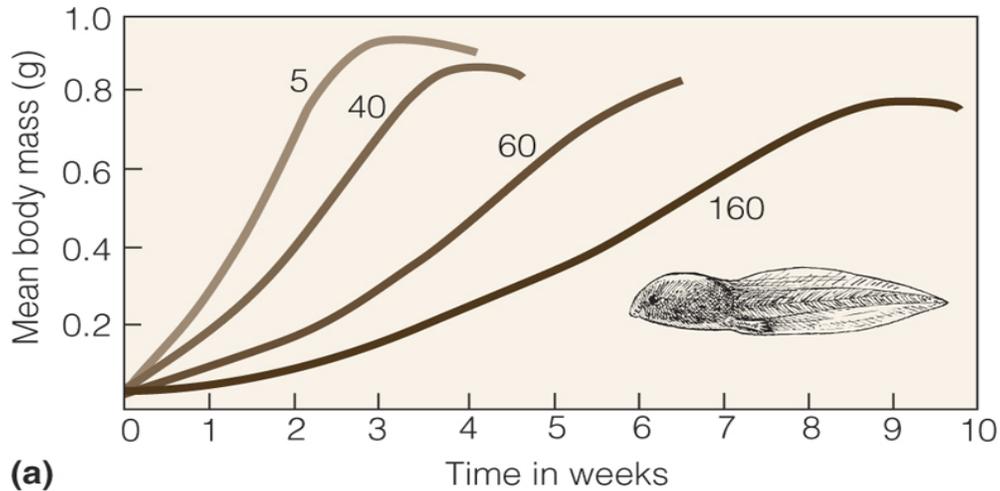
For the following, identify whether the relationship is:

(a) Commensalism; (b) Parasitism (c) Mutualism (d) None of these

1. --
2. Mistletoe
3. +,0
4. Ants on acacia trees
5. +,-

Interpret the figure below for 6 and 7





Interpret this figure from class, and also from your book, and answer the questions below. This depicts the results of a study where the number of tadpoles within a particular habitat (finite resources) were experimentally varied. Note that the numbers next to the lines are the numbers of individuals in each treatment.

8. As the number of tadpoles in the habitat increases, the mean body size at week three:

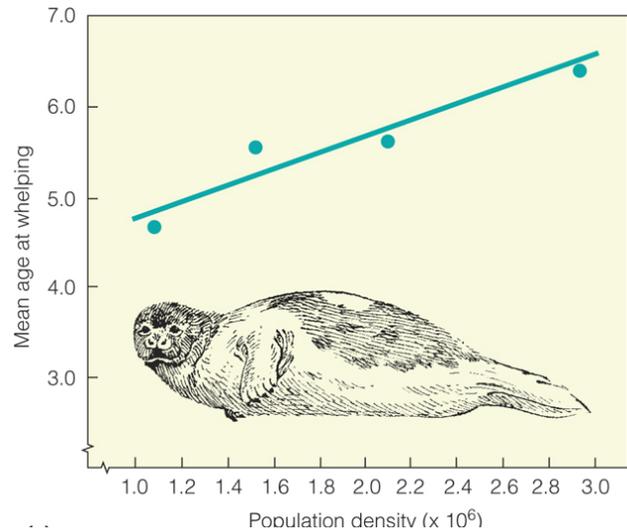
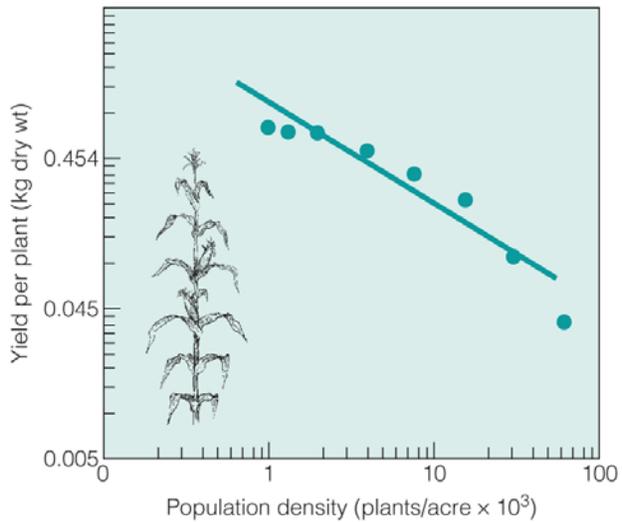
- (a) increases
- (b) decreases
- (c) cannot tell from this diagram

9. This figure indicates that:

- (a) access to resources decreases as population size decreases
- (b) access to resources increases as population size decreases
- (c) access to resources is not effected by population size

10. This figure provides support for:

- (a) density-dependent population regulation
- (b) density-independent population regulation
- (c) neither of these
- (d) both of these



Here are two figures from lecture. On the left is corn yield, on the right is seal reproduction. Interpret these and answer the questions below:

11. In the corn figure, the declining line indicates:

- (a) the influence of global warming on corn crops.
- (b) a reduction in available resources as population density increases.
- (c) increasing competition as population density increases
- (d) b & c
- (e) all of these.

12. In the seal figure, the positive line indicates:

- (a) more food available as the seals age
- (b) as the population density increases, the seals have less food
- (c) as the population density increases, seal age at reproduction increases.
- (d) b & c
- (e) none of these.

13. These two figures are evidence of:

- (a) density dependent competition
- (b) keystone predators
- (c) density independent population regulation
- (d) resource scarcity increases as the density of a population decreases

14. Which is not a prediction of the Lotka-Volterra model of competition between two species X and Y?

- (a) X wins
- (b) Y wins
- (c) X & Y are both driven to extinction
- (d) all of these are predictions.

Interpret this figure from class and your book:

15. In the top panel, the line that falls from high to low is Si- the species in competition with Af

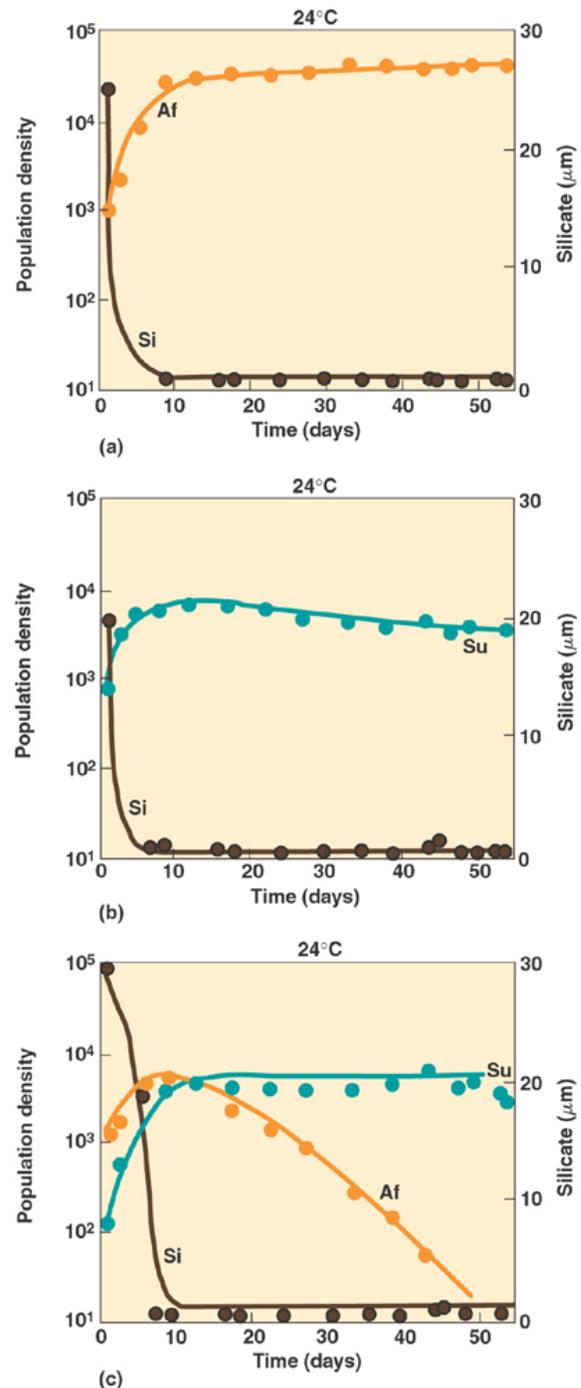
- (a) true
- (b) false

16. In the top and middle panels, the lines that increase and level off give the impression of:

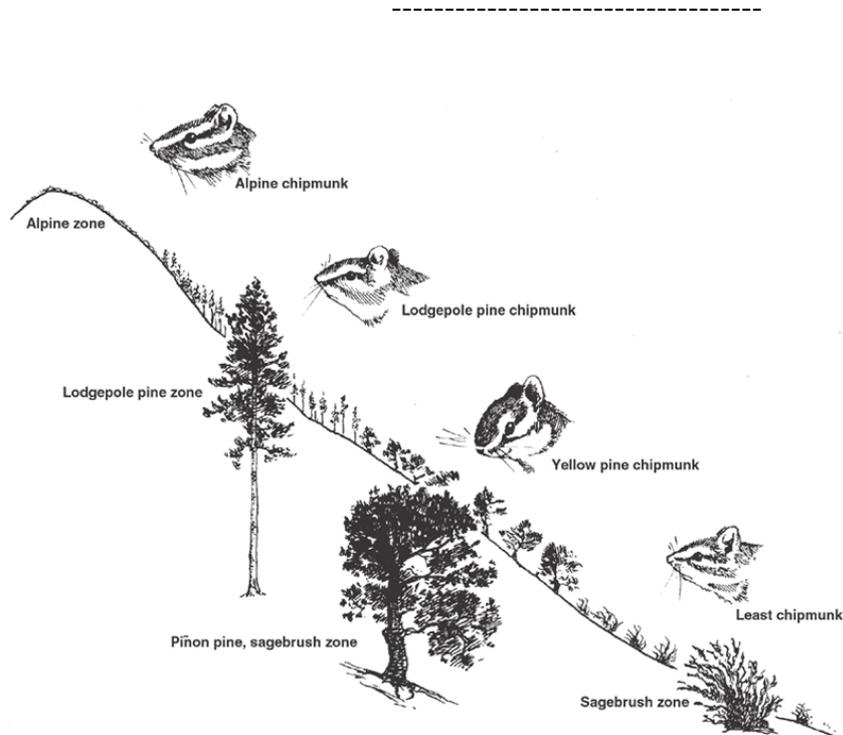
- (a) population regulation associated with unlimited resources.
- (b) exponential growth
- (c) population regulation associated with limited resources
- (d) logistic population growth
- (e) c & d

17. In the bottom panel, the line Af drops from high to low through time. That is because:

- (a) competition with Su
- (b) competition with Si
- (c) Si is a pathogen of Af but not Su
- (d) Si is a mutualist with Su, but not Af
- (e) none of these



18. GE Hutchinson's "*Paradox of the Plankton*" expresses the question:
- (a) why are there so few plankton species given abundant aquatic resources
 - (b) why are there so many plankton species when they appear to compete for the same resources.
 - (c) why are plankton species so rapidly declining when there is no evidence of competition.
 - (d) a & c
 - (e) none of these



19. According to a study ONLY of the distribution of animals along the mountainside like these chipmunks, could you say with certainty that you have defined the organisms potential niche?

- (a) yes
- (b) no

Regarding the figure on the right, which was discussed in class: (a) true, (b) false

20. The predator is choosing prey in a way that mirrors the mean distribution of body size in the habitat.

21. The predator is choosing prey based on energy efficiency of the process.

22. The factor that most strongly dictates food selection in the figure is:

- a) Prey item coloration
- b) Prey item length
- c) a & b
- d) Calories/Second Handling Time

23. The term for the selection of prey (food) items in this fashion:

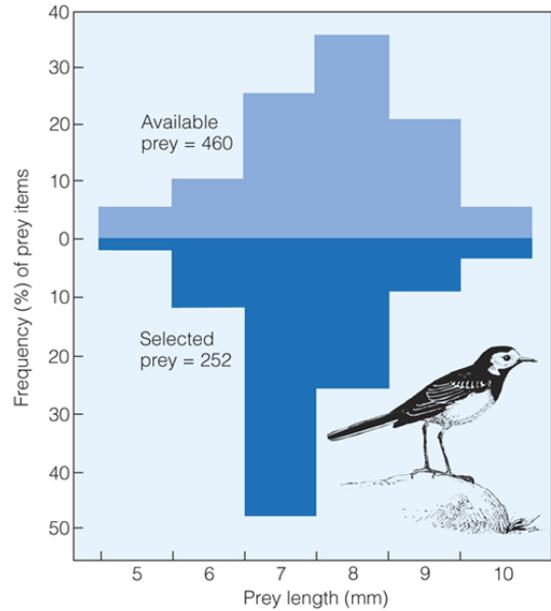
- a) Forage based- artificial selection
- b) Forage-dependent feeding hypothesis
- c) Optimal-foraging theory
- d) Trait-trait interaction
- e) None of these

24. Because of their hollow bones and sharp, hard, beaks, this theory (from Question 23) only applies to birds and no other animals:

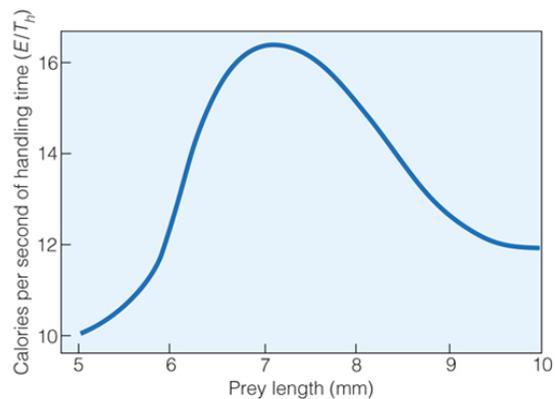
- (a) true
- (b) false

25. Which of the following is an example of aposematic coloration?

- (a) a brown bird that nests on the ground
- (b) a deer with a large, white tail
- (c) green spider on a green leaf
- (d) snakes with black, yellow, and red bands



(a)



(b)

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26. Most animals live in a relatively homogeneous environment in which the spatial density of prey does not vary much.

- (a) true
- (b) false

27. The risk of predation can sometimes have a significant impact on the foraging behavior of animals.

- (a) true
- (b) false

Concept Matching. Match each concept below

28. A mutualistic relationship between a bacteria and a plant.

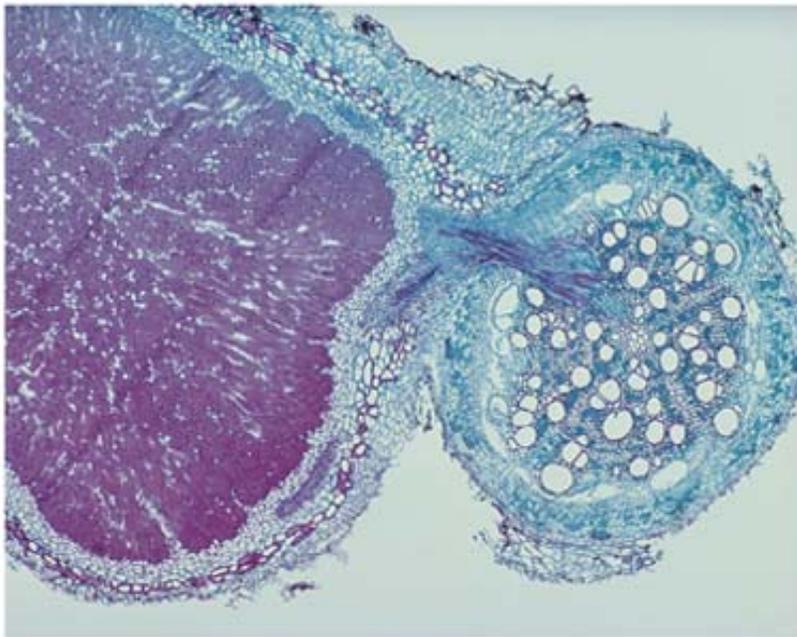
(a) rhizobium

(b) mycorrhizae

29. A mutualistic relationship between a fungi and a plant.

30. Increases plants ability to forage for water and nutrients

31.



32. Legumes

33. Practically all plant species do this!

Community Concept

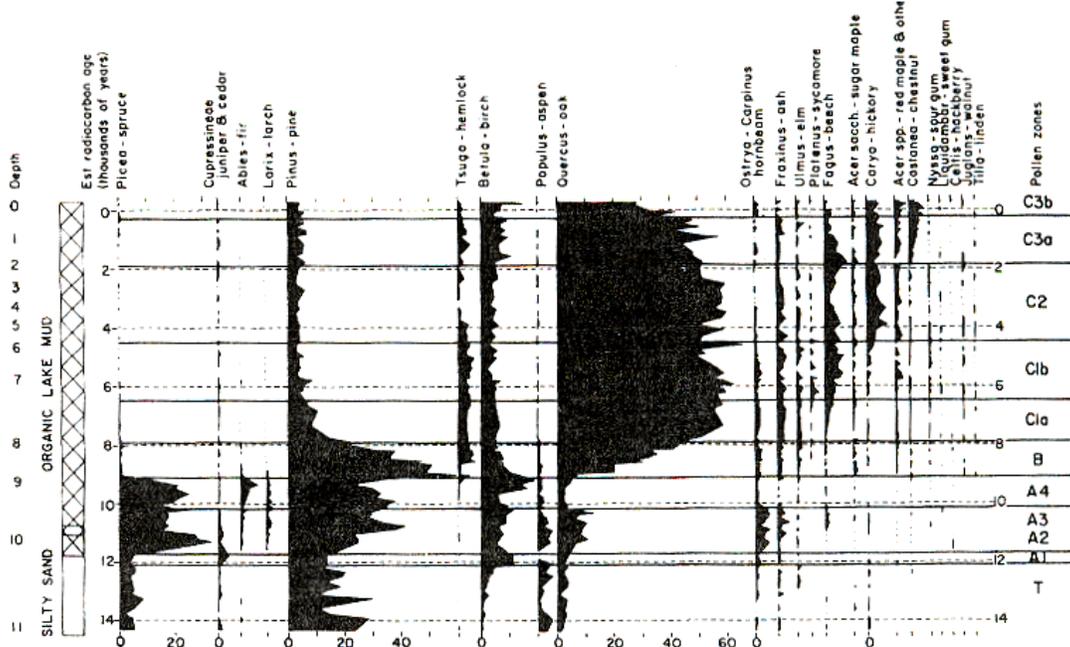


FIG. 4. Percentages for tree pollen types, calculated as percent total pollen from terrestrial plants, plotted against the absolute age of the sediment.

For the following questions refer to the figure above, which was discussed at length in class.

34. The figure above depicts:

(a) data collected by Suzanne Henderson focusing on seed production in trees from Arizona

(b) data collected by Lilley Iverson which depicts future tree movement across North America

(c) data collected by Margaret Davis from pollen measurements in a lake that depicts historical tree abundance.



True (a) or False (b)

35. The oldest records are near the bottom of the diagram, newer records at the top.

36. This figure demonstrates that ecological communities are stable over the long-term.

37. One implication of this figure is support for Fredric Clements view of communities.

38. This figure provides excellent evidence of long-term climate change in eastern North America

For the following statements regarding the organization of communities match either:

- a) matches the Gleason theory
- b) matches the Clements theory
- c) does not apply to either the view of either Gleason or Clements

39. communities are superorganisms

40. *"It can be confidently affirmed that stabilization is the universal principle of all vegetation"*.

41. communities are made up of species that are arrayed based strictly upon individualistic environmental needs

Given these two communities of mushrooms (below):

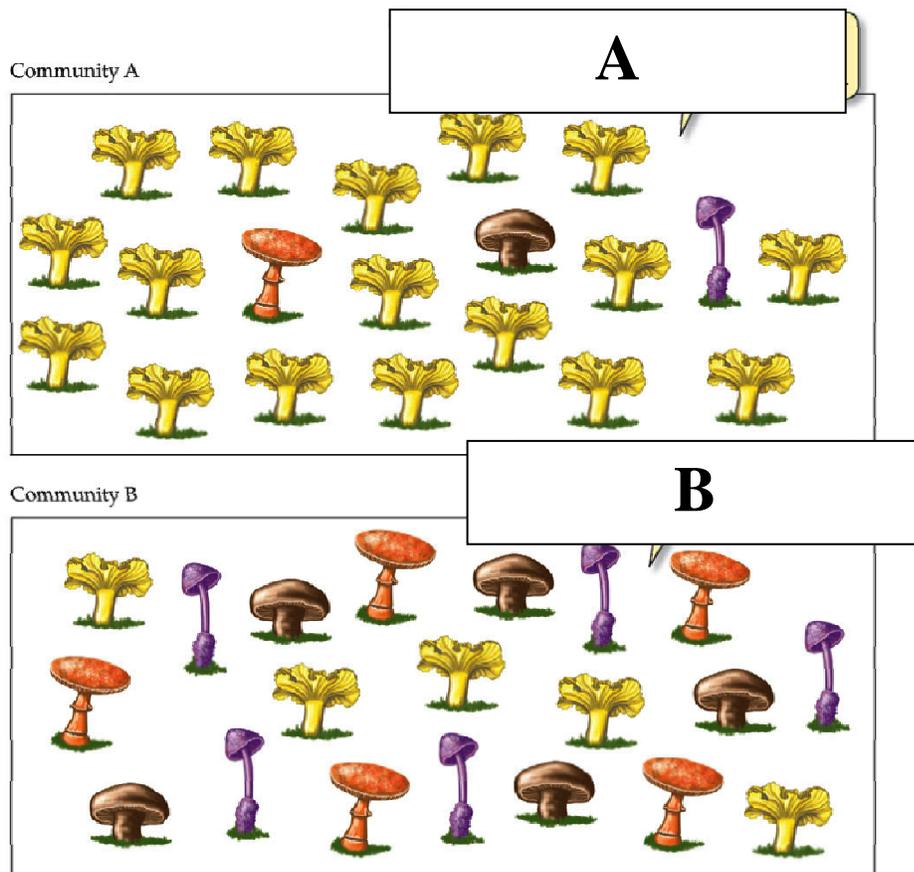
(a) Community 1; (b) Community 2 ; (c) Equal ; (d) Unable to discern

42. Greatest species richness

43. Highest diversity

44. Diversity and richness are equivalent from the perspective of the total ecology of an ecosystem

- (a) true
- (b) false



$$H' = - \sum_{i=1}^s p_i \ln p_i$$

For the next set of questions, refer to this equation:

(a) true; (b) false

45. This equation measures species richness

46. This equation is called the Aqib Talib index and measures success of dispersal of mammalian carcasses inflated with air from one location to another- this measure come to equilibrium at ~1,609 meters above sea level

47. The negative sign in front of this number indicates the loss of species which occurs following climate change.

48. According to recent estimates how many species are there on Earth that have been currently identified (named)?

- (a) 20,000
- (b) 200,000
- (c) 2,000,000
- (c) 20,000,000

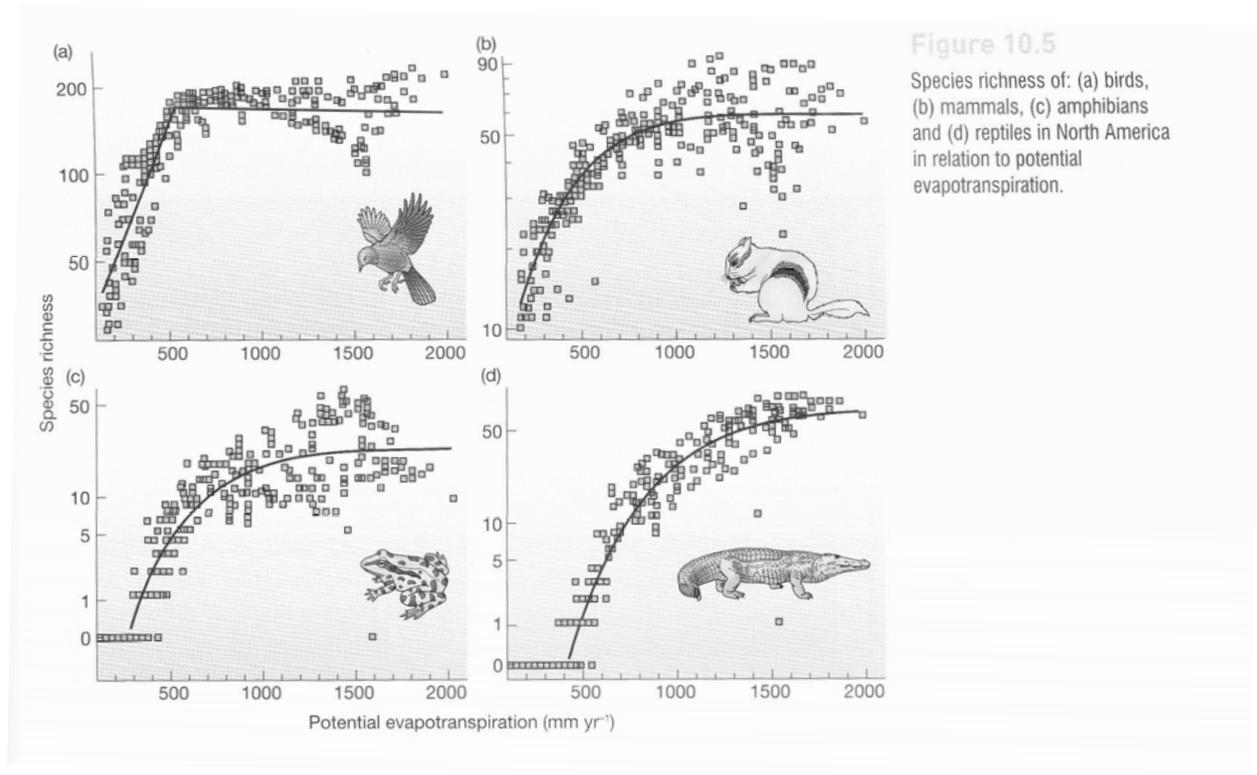
49. Most of these species are:

- (a) fish
- (b) plants
- (c) mussels
- (d) fungi
- (e) none of these.

50. How many species are there likely to exist?

- (a) 5,000,000
- (b) 50,000,000
- (c) 8,000,000
- (d) 80,000,000

51. How many species are lost to extinction each year, according to recent estimates?
- (a) 140
 - (b) 14,000
 - (c) 140,000
 - (d) all of them



52. Here is a figure from class, what does it mean?

- (a) There are more species in warmer, wetter locations
- (b) There are fewer species in warmer, wetter locations

53. Which is not a reason we discussed in class to explain this

- (a) Janzen-Connell hypothesis
- (b) lack of a dormant season in cooler climates
- (c) competition driving speciation
- (d) cold promotes rapid diversification, leading to fewer species
- (e) these were all reasons.

54. Which filters is not one predicted by “assembly rules” to be in place between a regional species pool and local population:

- (a) Dispersal
- (b) Attack by Titans
- (c) Abiotic Factors
- (d) Species Interactions

EXAM 2

ECOLOGY (BIO 310)

Dr. McEwan

NAME _____

On the bubble sheet fill in your NAME, your STUDENT number, and then enter the correct bubble on the Scantron sheet for each question as is customary. Good Luck

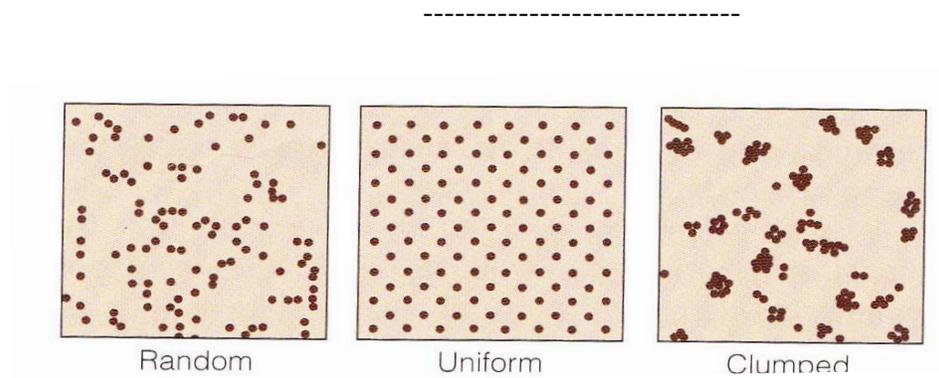
POPULATION ECOLOGY

1. If I wanted to understand the population density of *Pseudotsuga menziesii* in Oregon a method I could reasonably use is:

- a) fixed area plots
- b) mark recapture
- c) sign detection
- d) b & c

2. Sib competition occurs when relatively closely related members of a population interact with each other in competition for resources. This form of competition:

- a) can be a particularly important selective force
- b) is generally weak and inconsequential in populations
- c) has been shown to cause selection for minimizing dispersal so that seedlings remain directly under maternal plants
- d) a & c



3. Considering these distribution patterns- as discussed in class- the clumped pattern is virtually impossible to find in nature;

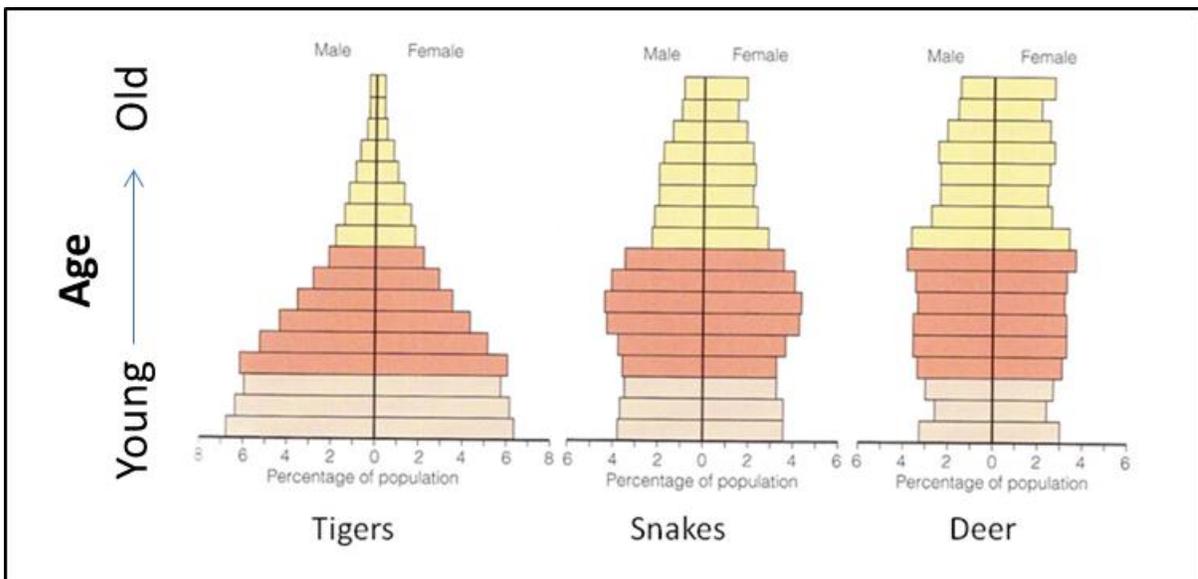
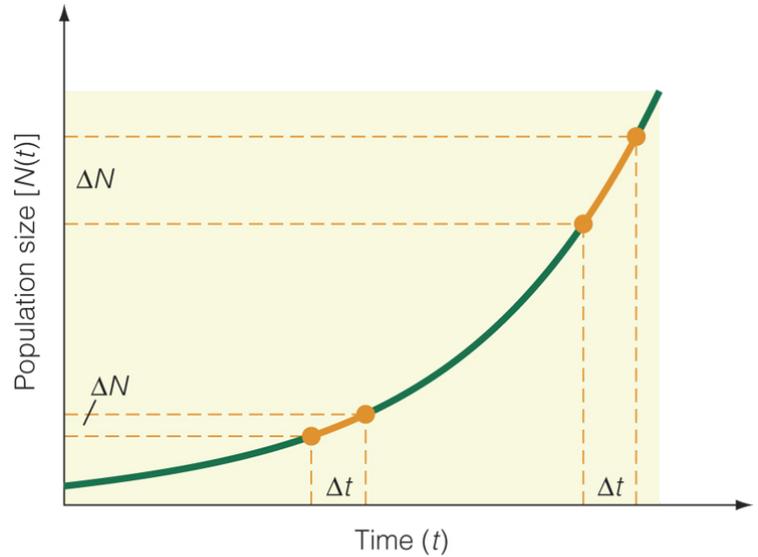
- a) true
- b) false

This diagram describes change in a population through time. Answer the following questions a) true or b) false.

4. The slope of this line- *change in population size over a particular time*- is the intrinsic rate of population growth which is abbreviated “K”

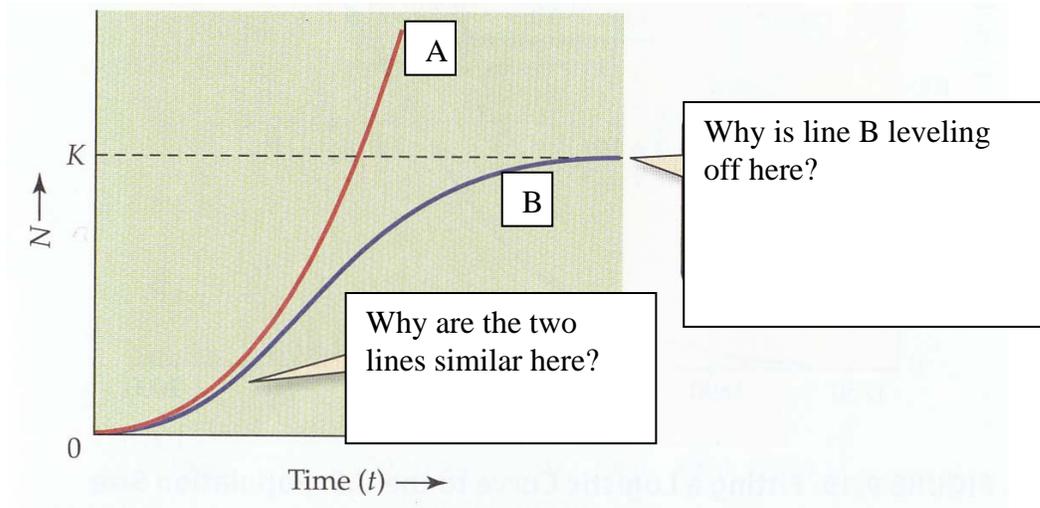
5. Examples of populations that grew in this manner, as discussed in class, included caribou in a reintroduction and emerald ash borer.

6. This curve nicely illustrates the activity of carrying capacity in limiting population growth.



Based on the above population figures and answer the following questions either (a) true or (b) false:

7. Tiger populations are decreasing over the long term
8. Deer population are increasing rapidly over the long term
9. The distribution of population in snakes is heavily weighted toward old individuals
10. All three of the populations show a strong age-specific trend where middle aged individuals dominated the populations.



This is a figure from the discussion in class. It depicts population growth of organisms under contrasting assumptions. The lines A and B reflect those contrasting assumptions. In this figure, there is no consideration given to the activity of other species (e.g., this does not consider predation or interspecific competition).

11. A plausible, and theoretically sound, explanation of why is B leveling off would be:

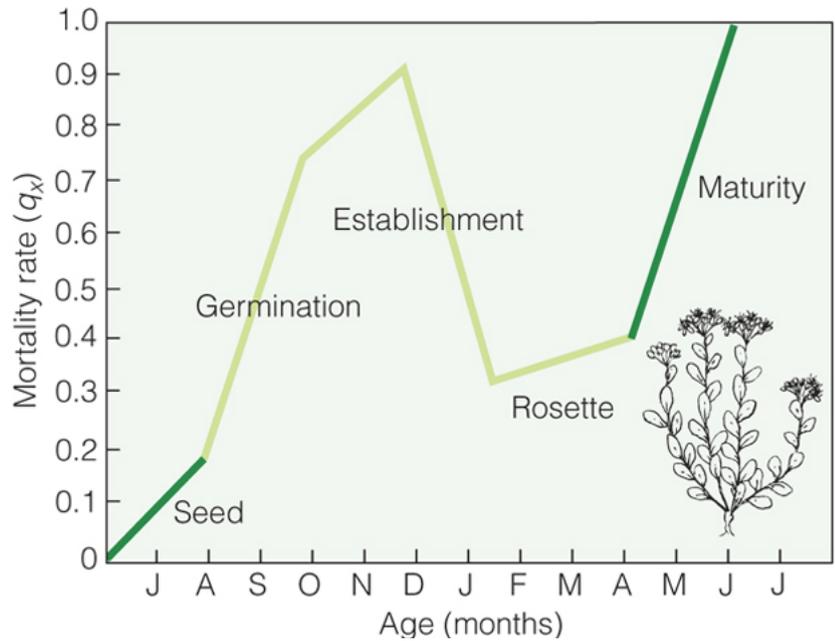
- a) the population growth is unlimited because of resources.
- b) the population has arrived at Carrying Capacity (K)
- c) the population has arrived at a resource threshold.
- d) b & c

12. A plausible, and theoretically sound, explanation of why the two lines are similar at the point indicated on the figure would be:

- a) at that time point, the number of individuals is too great for the lines to separate.
- b) at that time point, predation factors overwhelm population growth
- c) at that time point, the two populations experience abundant resources, the activity associated with population limitation is not yet in play.

13. For the moment, let's imagine that this figure represents an endangered species that you have been hired to manage. You have seeds you can plant, or you can grow the plant up and plant it once it reaches rosette. If you wanted to maximize *survivorship in the field* for each individual, which would you do:

- a) plant seeds and allow them to go through germination in the field.
- b) grow the seeds into plants, and then plant them in the field as rosettes.



For the following list, choose whether you expect the organism to have a survivorship curve described as

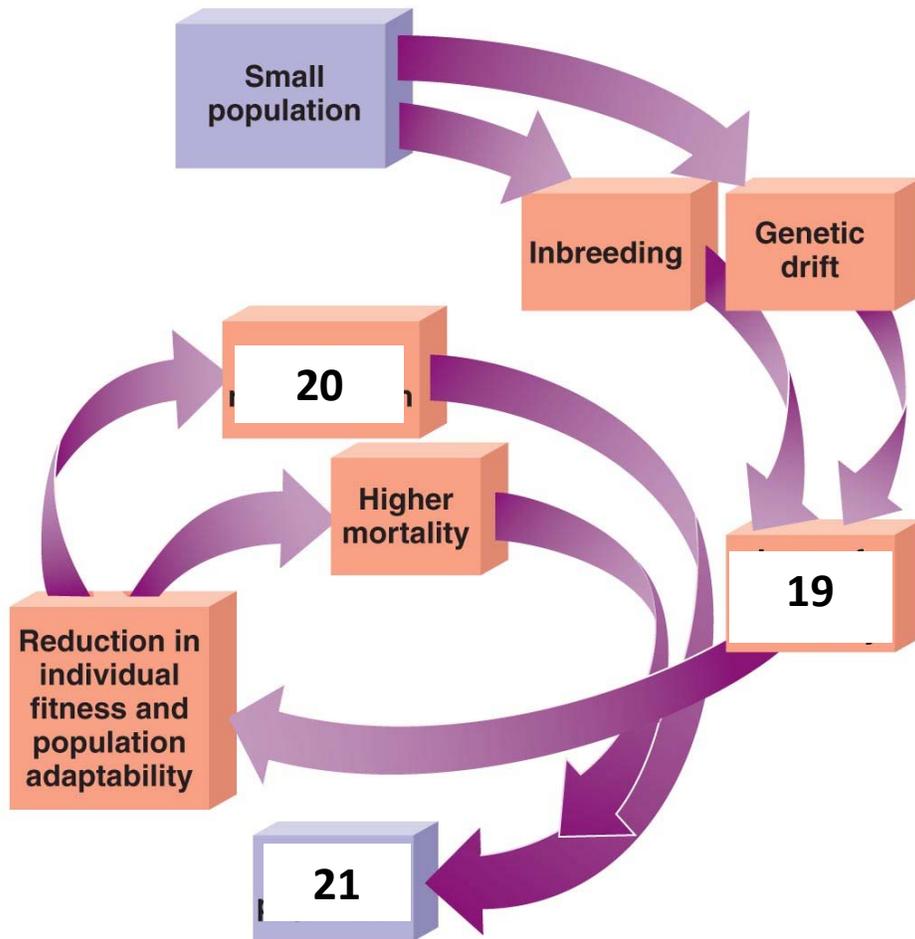
- a) Type I; b) Type II; c) Type III

- 14. tiger
- 15. maple tree
- 16. human
- 17. bird

18. At small population numbers, when resource are abundant and there is no competition, we expect to see populations increase rapidly. Sometimes we see the exact opposite effect- small populations get smaller! The processes that influence this *specifically for small populations* are called:

- a) Allee Effects
- b) Environmental stochasticity
- c) Predation
- d) Competition
- e) all of these

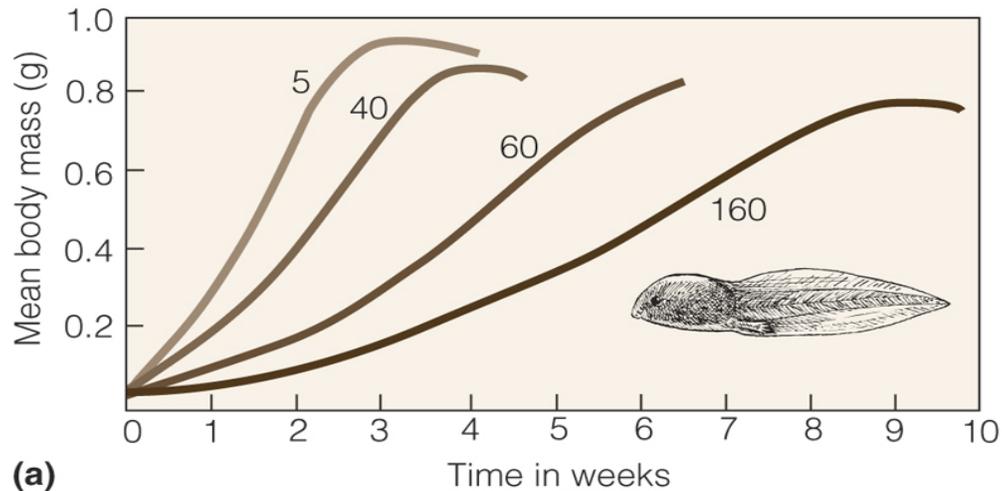
Fill in the boxes on the extinction vortex:



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- a) Demographic stochasticity
- b) Larger Population
- c) Lower Reproduction
- d) Loss of Genetic Variation
- e) Smaller Population

Organismal Interactions



Interpret this figure from class, and also from your book, and answer the questions below. This depicts the results of a study where the number of tadpoles within a particular habitat (finite resources) were experimentally varied. Note that the numbers next to the lines are the numbers of individuals in each treatment.

22. As the number of tadpoles in the habitat increases, the mean body size at week three:

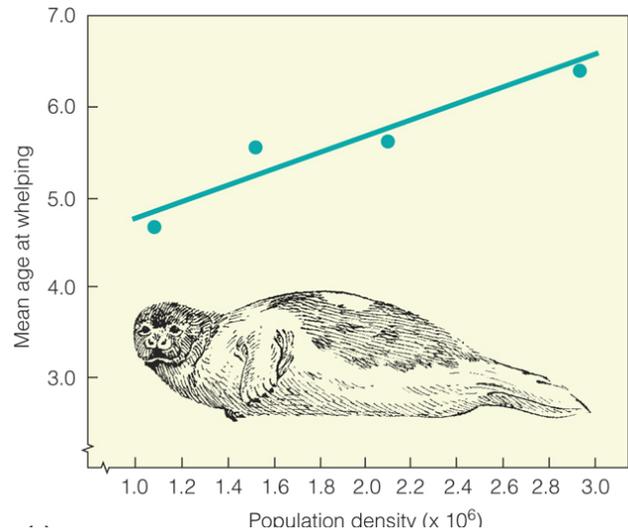
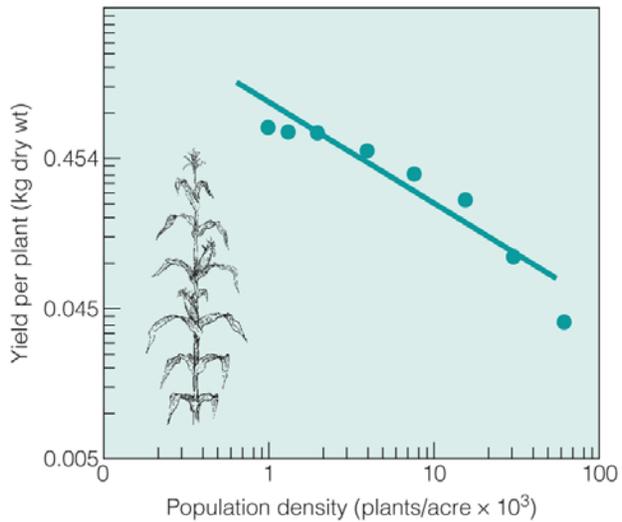
- (a) increases
- (b) decreases
- (c) cannot tell from this diagram

23. This figure indicates that:

- (a) access to resources decreases as population size decreases
- (b) access to resources increases as population size decreases
- (c) access to resources is not effected by population size

24. This figure provides support for:

- (a) density-dependent population regulation
- (b) density-independent population regulation
- (c) neither of these
- (d) both of these



Here are two figures from lecture. On the left is corn yield, on the right is seal reproduction. Interpret these and answer the questions below:

25. In the corn figure, the declining line indicates:

- (a) the influence of global warming on corn crops.
- (b) a reduction in available resources as population density increases.
- (c) increasing competition as population density increases
- (d) b & c
- (e) all of these.

26. In the seal figure, the positive line indicates:

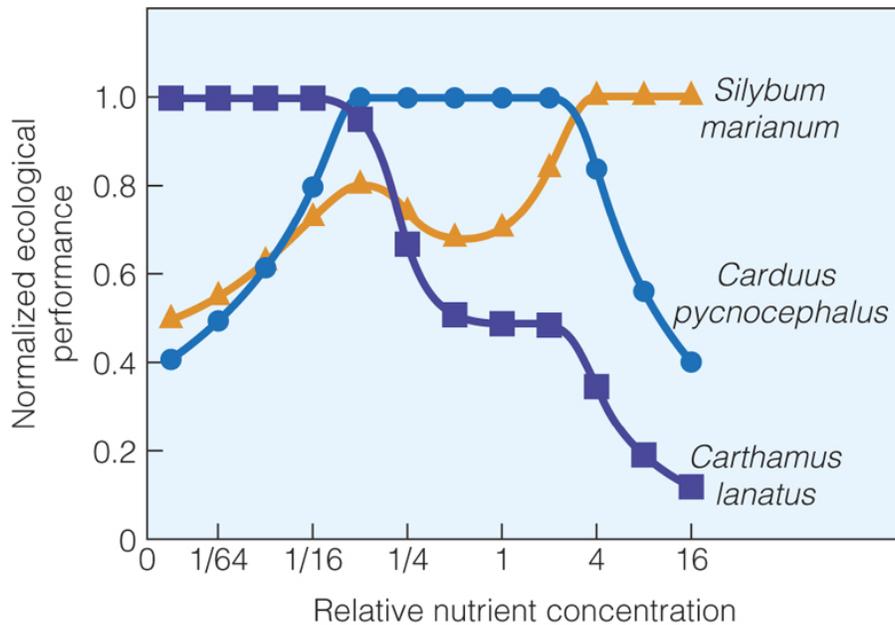
- (a) more food available as the seals age
- (b) as the population density increases, the seals have less food
- (c) as the population density increases, seal age at reproduction increases.
- (d) b & c
- (e) none of these.

27. These two figures are evidence of:

- (a) density dependent competition
- (b) keystone predators
- (c) density independent population regulation
- (d) resource scarcity increases as the density of a population decreases

28. Which is not a prediction of the Lotka-Volterra model of competition between two species X and Y?

- (a) X wins
- (b) Y wins
- (c) X & Y are both driven to extinction
- (d) all of these are predictions.



Interpret this figure from class and your book:

29. Across this gradient, *Carthamus lanatus* is dominant under conditions that require tolerance of:

- (a) low nutrient concentration
- (b) high nutrient concentration

30. Across this gradient, *Silybum marianum* is dominant under conditions that require tolerance of:

- (a) low nutrient concentration
- (b) high nutrient concentration

31. A reasonable postulate as to why *Silybum marianum* is dominant on that portion of the gradient is:

- (a) competitive ability
- (b) stress tolerance

For the following, identify whether the relationship is:

- (a) Commensalism
- (b) Parasitism
- (c) Mutualism

32. +,+

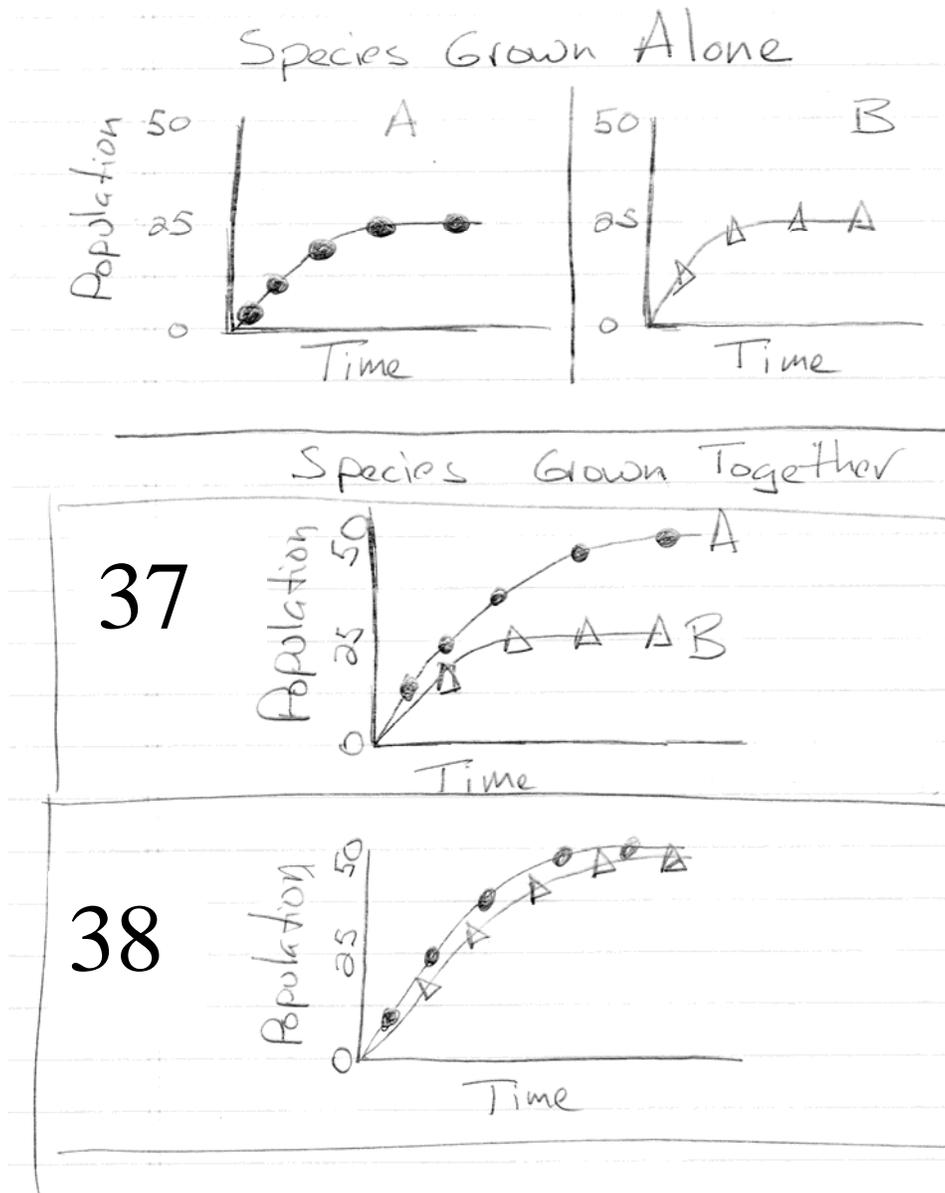
33. Human gut fauna

34. +,0

35. Ants on acacia trees

36. +,-

Interpret the figure below for 37 and 38



39. GE Hutchinson's "*Paradox of the Plankton*" expresses the question:
- (a) why are there so few plankton species given abundant aquatic resources
 - (b) why are there so many plankton species when they appear to compete for the same resources.
 - (c) why are plankton species so rapidly declining when there is no evidence of competition.
 - (d) a & c
 - (e) none of these

Regarding the figure on the right, which was discussed in class: (a) true, (b) false

40. The predator is choosing prey in a way that mirrors the mean distribution of body size in the habitat.

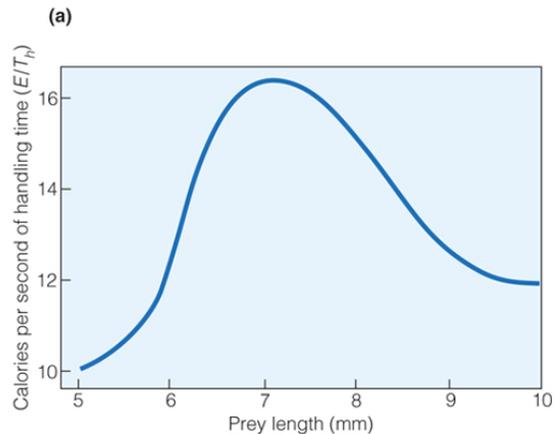
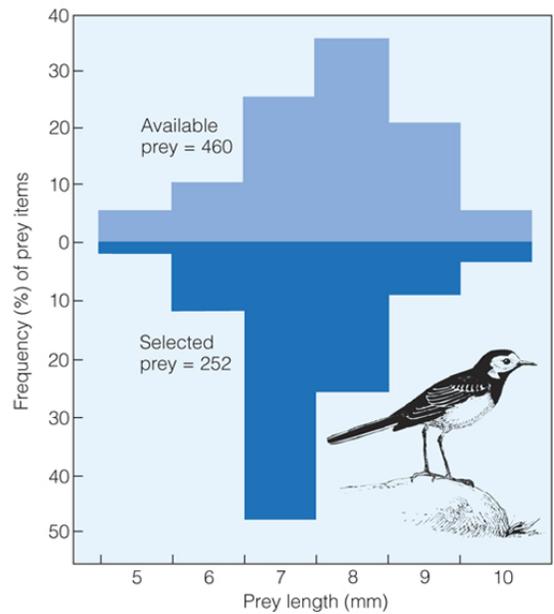
41. The predator is choosing prey based on energy efficiency of the process.

42. The factor that most strongly dictates food selection in the figure is:

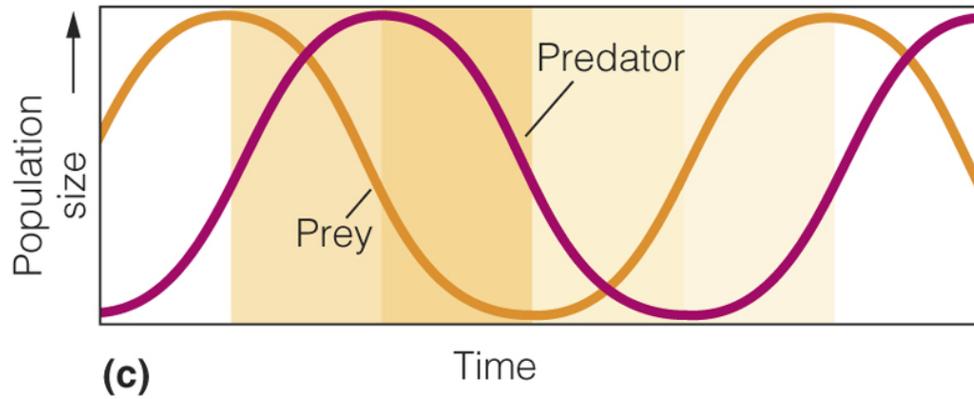
- a) Prey item coloration
- b) Prey item length
- c) a & b
- d) Calories/Second Handling Time

43. The term for the selection of prey (food) items in this fashion:

- a) Forage based- artificial selection
- b) Forage-dependent feeding hypothesis
- c) Optimal-foraging theory
- d) Trait-trait interaction
- e) None of these



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44. In this figure, which was discussed in class, predator and prey populations track one another through time. This pattern is known as coupled-oscillation:

- (a) true
- (b) false

45. Which of the following is an example of cryptic coloration?

- (a) a brown bird that nests on the ground
- (b) a deer with a large, white tail
- (c) skunks with black and white stripes
- (d) snakes with black, yellow, and red bands

46. Most animals live in a relatively homogeneous environment in which the spatial density of prey does not vary much.

- (a) true
- (b) false

47. The risk of predation can sometimes have a significant impact on the foraging behavior of animals.

- (a) true
- (b) false

48. As prey species evolve more effective means to avoid being caught, predators evolve more effective means to capture them.

- (a) true
- (b) false

49. Over evolutionary time, responses to predator activity can induce changes in prey phenotype.

- (a) true
- (b) false

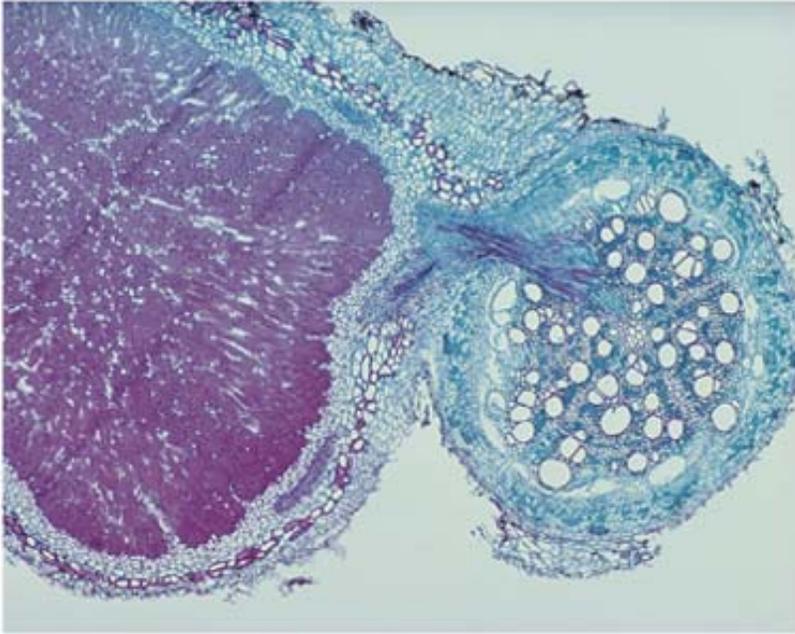
Concept Matching. Match each concept below

50. A mutualistic relationship between a bacteria and a plant.

51. A mutualistic relationship between a fungi and a plant.

52. Increases plants ability to forage for water and nutrients

53.



54. Legumes

55. Practically all plant species do this!

(a) rhizobium

(b) mycorrhizae

Lichens is a 56. _____ relationship made up of 57. _____

(a) mutualistic

(b) parasitic

(c) predatory

(d) chemoautotrophic

(a) a fungus and a plant

(b) a fungus and an algae

(c) an algae and a plant

(d) an animal and a fungus

(e) an animal and a plant

Community Concept

For the following statements regarding the organization of communities match either:

- a) matches the Gleason theory
- b) matches the Clements theory
- c) does not apply to either the view of either Gleason or Clements

58. communities are superorganisms

59. *“It can be confidently affirmed that stabilization is the universal principle of all vegetation”.*

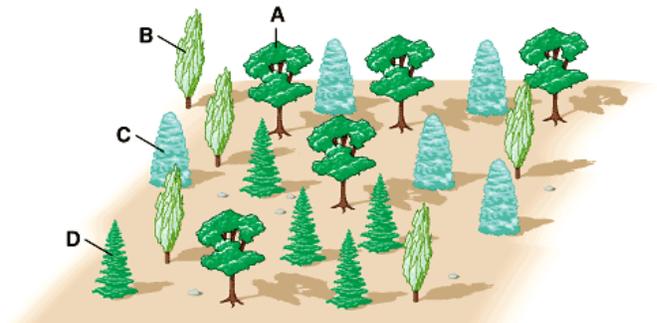
60. succession is a deterministic, step-wise process, leading inevitably to a particular species composition

61. communities are made up of species that are arrayed based strictly upon individualistic environmental needs

62. Robert Whittaker’s work in the Smoky Mountains

Given these two communities (on the right):

- (a) Community 1
- (b) Community 2
- (c) Equal
- (d) Unable to discern



Community 1

A: 25% B: 25% C: 25% D: 25%

63. Greatest species richness

64. Highest diversity

65. Diversity and richness are equivalent from the perspective of the total ecology of an ecosystem

- (a) true
- (b) false



Community 2

A: 80% B: 5% C: 5% D: 10%

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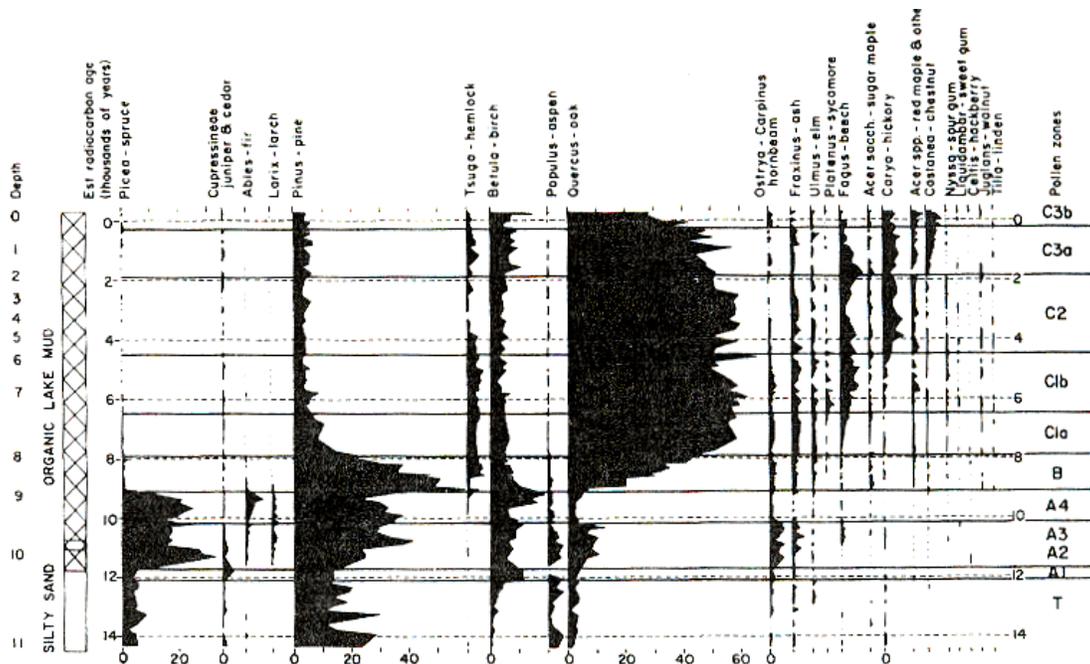


FIG. 4. Percentages for tree pollen types, calculated as percent total pollen from terrestrial plants, plotted against the absolute age of the sediment.

For the following questions refer to the figure above, which was discussed at length in class.

66. The figure above depicts:

- (a) data collected by Mitchell Henderson focusing on seed production in trees from Arizona
- (b) data collected by Louis Iverson which depicts future tree movement across North America
- (c) data collected by Margaret Davis from pollen measurements in a lake that depicts historical tree abundance.

True (a) or False (b)

67. The oldest records are near the bottom of the diagram, newer records at the top.

68. This figure demonstrates that ecological communities are stable over the long-term.

69. One implication of this figure is support for Fredric Clements view of communities.

70. This figure provides excellent evidence of long-term climate change in eastern North America

Food Webs & Community Regulation

71. When Robert Paine removed the *Pisaster* starfish from coastal waters the species diversity of the overall community:

- (a) increased
- (b) decreased

72. Top-down regulation of communities:

- (a) implies that primary producers are the key to ecosystem structure
- (b) implies that primary consumers are the key to ecosystem structure
- (c) implies that top predators are the key to ecosystem structure

73. In the Aldo Leopold essay “Thinking Like a Mountain”:

- (a) Leopold describes his experience as a young man killing a deer
- (b) Leopold provides an example of a the Keystone Predator concept
- (c) a & b

74. In the Leopold essay, the effect he describes could be considered a trophic cascade:

- (a) true
- (b) false

75. Concerning the figure on the right:

What “keystone” process do I perform in forests of Madagascar?

- (a) I feed on mosquitoes that carry disease, by controlling their population I control the disease spread
- (b) my guano is a critical nutrient for the Madagascar flowering locust.
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EXAM 2

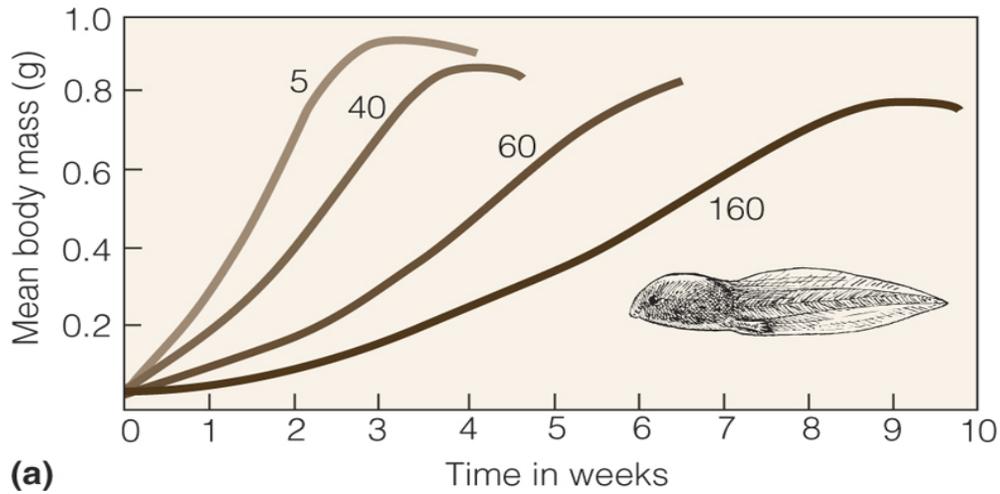
ECOLOGY (BIO 310)

Dr. McEwan

NAME _____

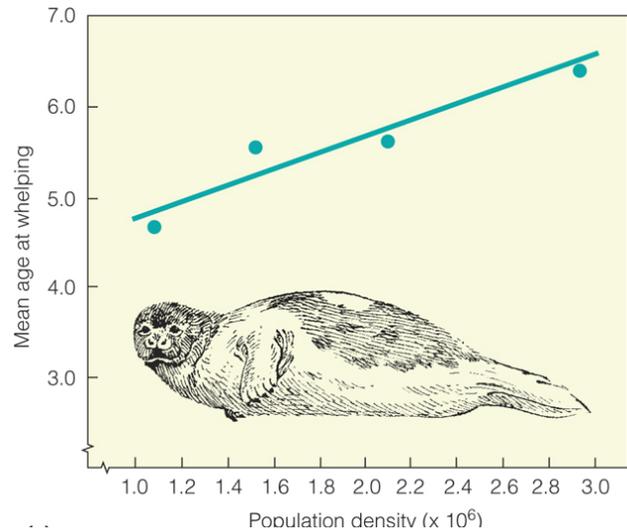
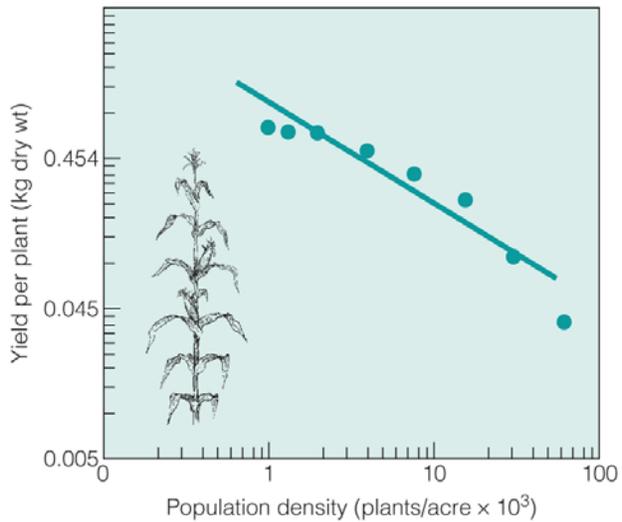
Fill in your NAME, your STUDENT number, and then enter the correct bubble on the Scantron sheet for each question as is customary. Good Luck

Organismal Interactions



Interpret this figure from class, and also from your book, and answer the questions below. This depicts the results of a study where the number of tadpoles within a particular habitat (finite resources) were experimentally varied. Note that the numbers next to the lines are the numbers of individuals in each treatment.

- As the number of tadpoles in the habitat increases, the mean body size at week three:
 - increases
 - decreases
 - cannot tell from this diagram
- This figure indicates that:
 - access to resources decreases as population size decreases
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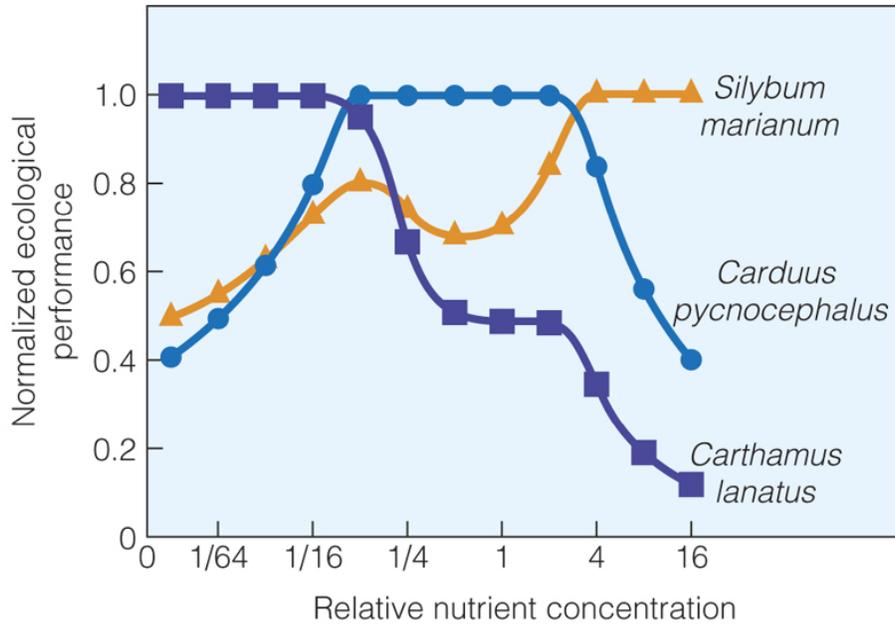
Here are two figures from lecture. On the left is corn yield, on the right is seal reproduction. Interpret these and answer the questions below:

4. In the corn figure, the declining line indicates:
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 - (b) a reduction in available resources as population density increases.
 - (c) increasing competition as population density increases
 - (d) b & c
 - (e) all of these.

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6. These two figures are evidence of:
 - (a) density dependent competition
 - (b) keystone predators
 - (c) density independent population regulation
 - (d) resource scarcity increases as the density of a population decreases

7. Which is not a prediction of the Lotka-Volterra model of competition between two species X and Y?
 - (a) X wins
 - (b) Y wins
 - (c) X & Y are both driven to extinction
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Interpret this figure from class and your book:

8. Across this gradient, *Carthamus lanatus* is dominant under conditions that require tolerance of:

- (a) low nutrient concentration
- (b) high nutrient concentration

9. Across this gradient, *Silybum marianum* is dominant under conditions that require tolerance of:

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10. A reasonable postulate as to why *Silybum marianum* is dominant on that portion of the gradient is:

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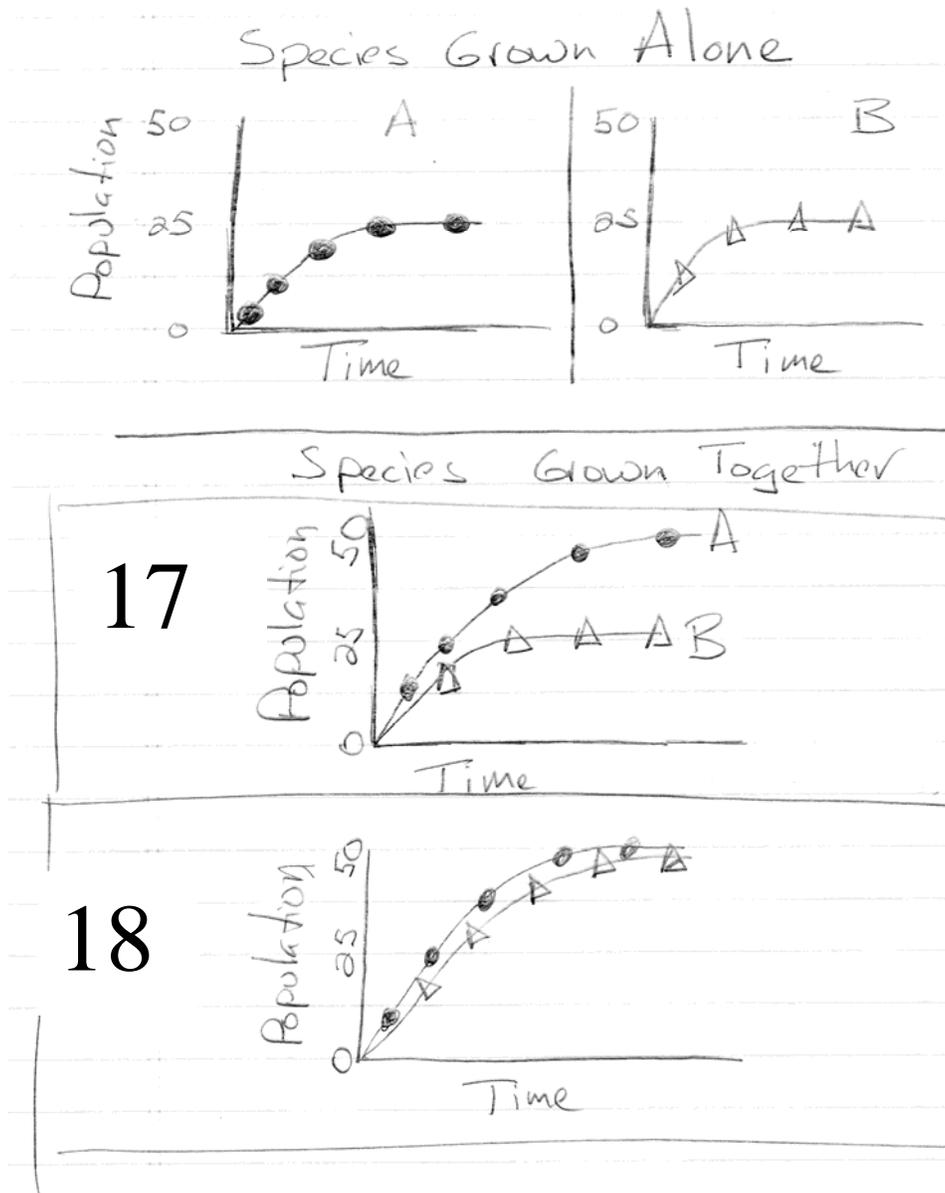
- (a) why are there so few plankton species given abundant aquatic resources
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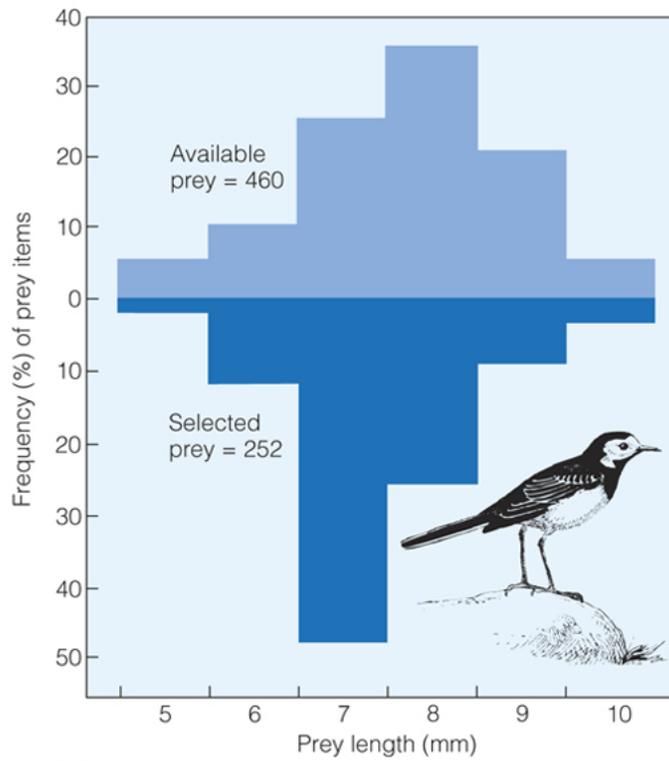
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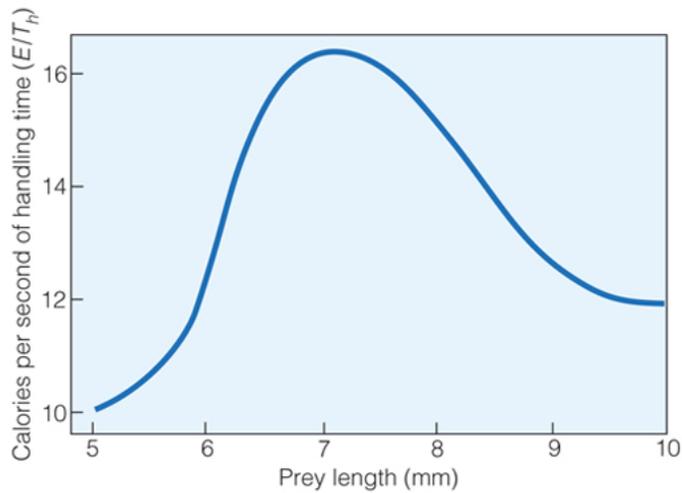
- 12. +,+
- 13. Human gut fauna
- 14. +,0
- 15. Ants on acacia trees
- 16. +,-

Interpret the figure below for 17 and 18





(a)



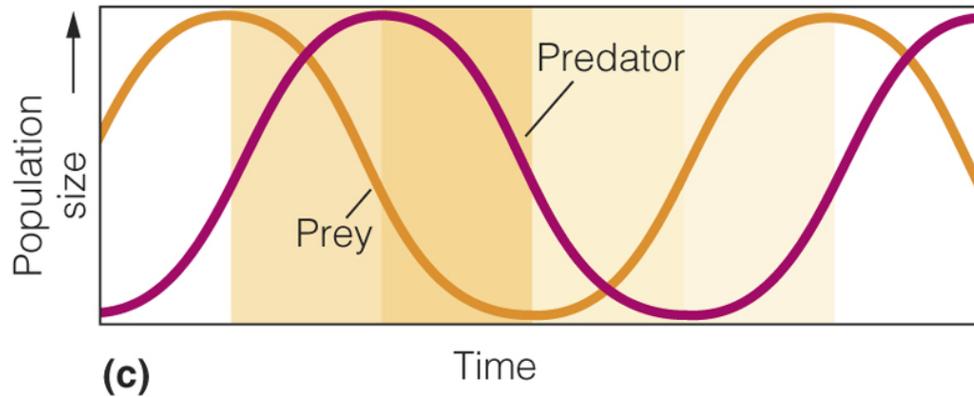
(b)

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Regarding the figure above which was discussed in class: (a) true, (b) false

19. The predator is choosing prey in a way that mirrors the mean distribution of body size in the habitat.

20. The predator is choosing prey based on energy efficiency of the process.



21. In this figure, which was discussed in class, predator and prey populations track one another through time. This pattern is known as coupled-oscillation:

- (a) true
- (b) false

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- (a) a brown bird that nests on the ground
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23. Most animals live in a relatively homogeneous environment in which the spatial density of prey does not vary much.

- (a) true
- (b) false

24. The risk of predation can sometimes have a significant impact on the foraging behavior of animals.

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- (b) false

25. As prey species evolve more effective means to avoid being caught, predators evolve more effective means to capture them.

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26. Over evolutionary time, predators can induce changes in prey phenotype.

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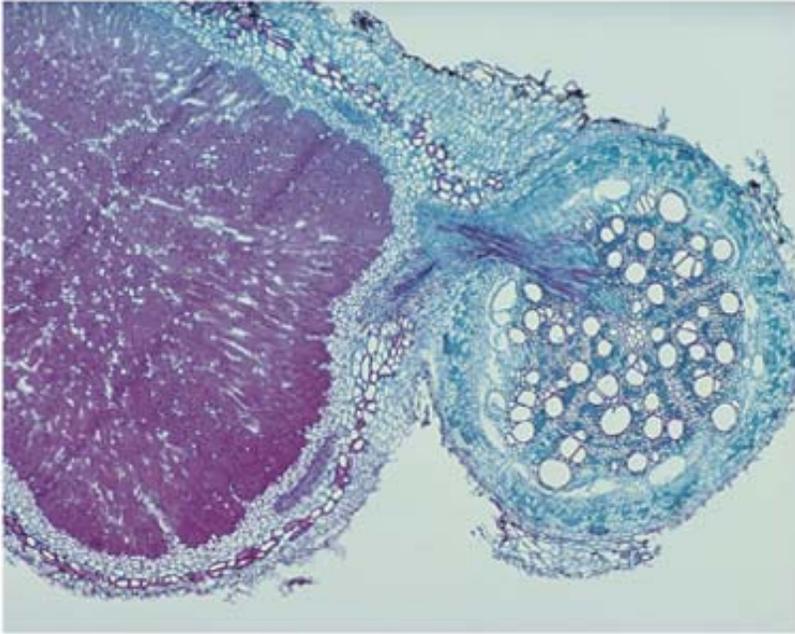
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Community Concept

For the following statements regarding the organization of communities match either:

- a) matches the Gleason theory
- b) matches the Clements theory
- c) does not apply to either the view of either Gleason or Clements

35. communities are superorganisms

36. communities develop to a predictable endpoint that is governed by climate.

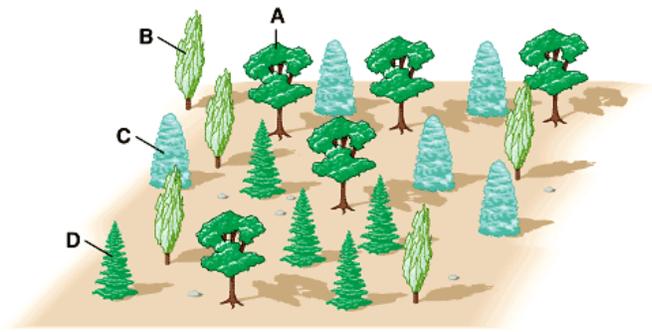
37. succession is a deterministic, step-wise process, leading inevitably to a particular species composition

38. communities are made up of species that are arrayed based strictly upon individualistic environmental needs

39. Robert Whittaker's work in the Smoky Mountains

Given these two communities:

- (a) Community 1
- (b) Community 2
- (c) Equal
- (d) Unable to discern



Community 1

A: 25% B: 25% C: 25% D: 25%

40. Greatest species richness

41. Highest diversity

42. Diversity and richness are equivalent from the perspective of the total ecology of an ecosystem

- (a) true
- (b) false



Community 2

A: 80% B: 5% C: 5% D: 10%

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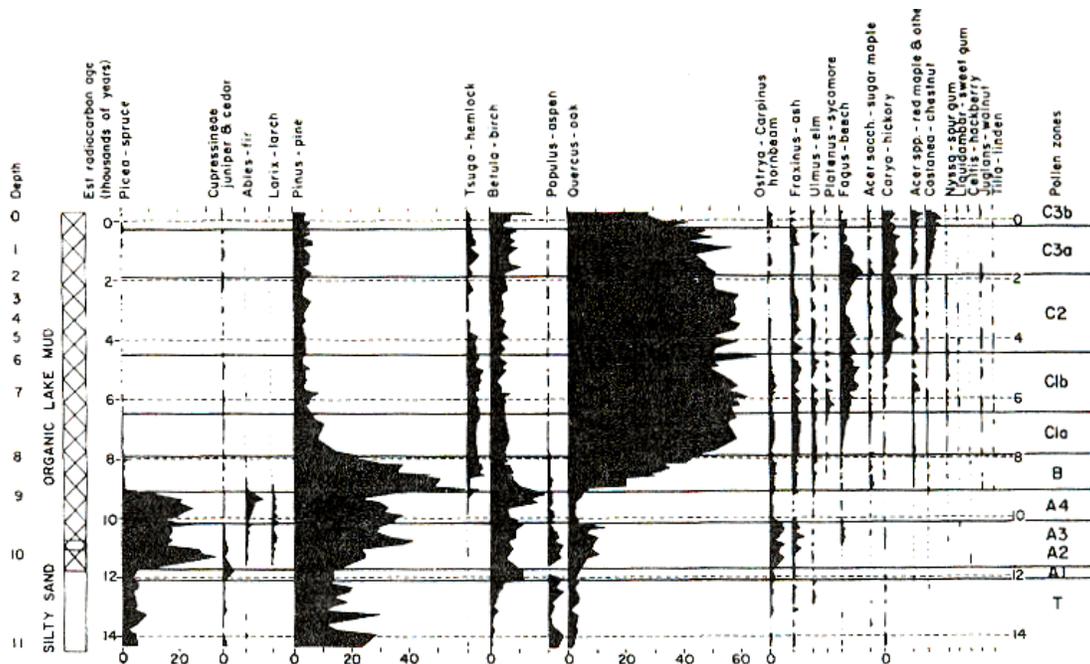


FIG. 4. Percentages for tree pollen types, calculated as percent total pollen from terrestrial plants, plotted against the absolute age of the sediment.

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True (a) or False (b)

44. This figure demonstrates that ecological communities are stable over the long-term.

45. One implication of this figure is support for Fredric Clements view of communities.

46. This figure provides excellent evidence of long-term climate change in eastern North America

Food Webs & Community Regulation

47. When Robert Paine removed the *Pisaster* starfish from coastal waters the species diversity of the overall community:

- (a) increased
- (b) decreased

48. Top-down regulation of communities:

- (a) implies that primary producers are the key to ecosystem structure
- (b) implies that primary consumers are the key to ecosystem structure
- (c) implies that top predators are the key to ecosystem structure

49. In the Aldo Leopold essay “Thinking Like a Mountain”:

- (a) Leopold describes his experience as a young man killing a deer
- (b) Leopold provides an example of a the Keystone Predator concept
- (c) a & b

50. In the Leopold essay, the effect he describes could be considered a trophic cascade:

- (a) true
- (b) false

51. Concerning the figure on the right:

What “keystone” process do I perform in forests of Madagascar?

- (a) I feed on mosquitoes that carry disease, by controlling their population I control the disease spread
- (b) my guano is a critical nutrient for the Madagascar flowering locust.
- (c) I disperse seeds of trees
- (d) I am the keystone predator in the well known vole -beetle-lichens micro-foodweb in Madagascar
- (e) none of these

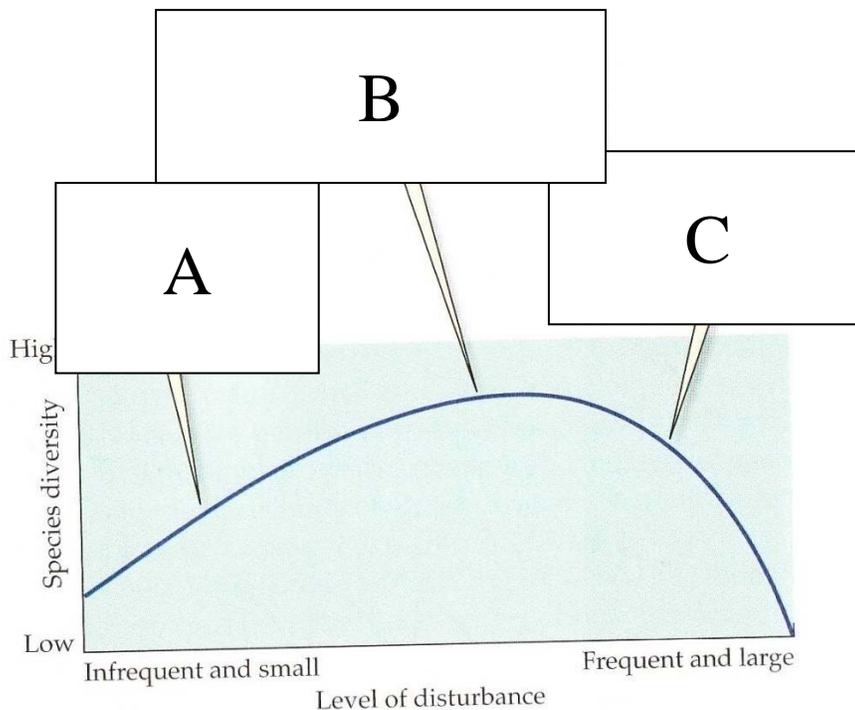


52. The ecological filters, in order of function, that are thought to regulate ecological communities are:

- (a) Dispersal; Immigration; Predation
- (b) Dispersal; Abiotic; Species Interactions
- (c) Dispersal; Abiotic; Nutrient Environment
- (d) Dispersal; Keystone Predators; Abiotic
- (e) none of these

53. In almost any ecosystem, as you increase the area of sampling, the number of species encountered will _____.

- (a) decrease
- (b) remain the same
- (c) increase



Answer the following questions for the figure above

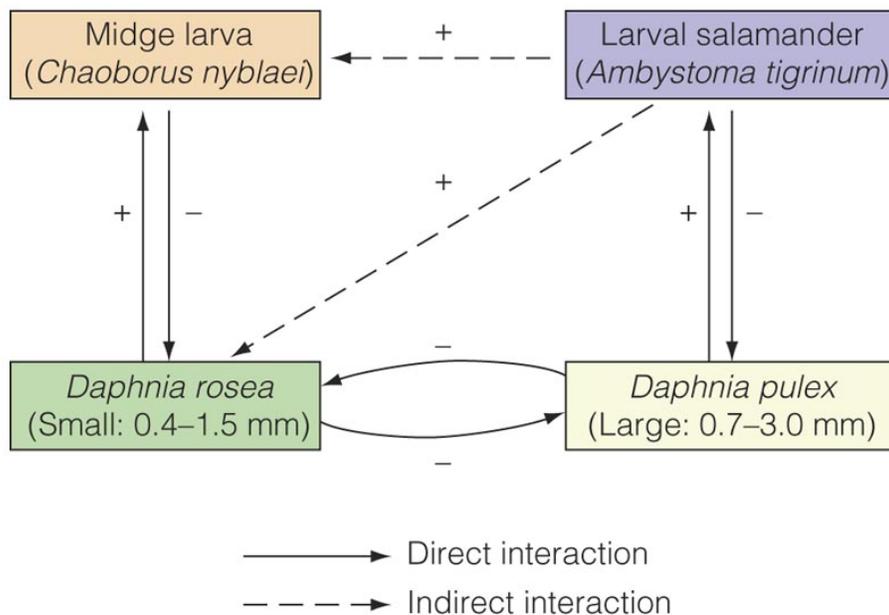
54. At point _____ competition is limiting the diversity of the system

55. At point _____ tolerance to harsh conditions is limiting the diversity of the system

56. This pattern is _____ in nature

- (a) commonly found
- (b) rare

57. This relationship is commonly call the Diversity-Time Hypothesis because of the time needed for the community to develop: (a) true; (b) false



Concerning this figure discussed at length in class:

- (a) true,
 - (b) false
58. The larval salamander and *Daphnia rosea* are *both* predators.
59. The presence of salamander decreases the numbers of midge larvae.
60. The salamander eggs are consumed by the *Daphnia* species
61. Both *Daphnia* are prey items for the salamander.

Succession

62. A tidal wave snaps off trees on a sea shore in Guam. The process of the broken down vegetation returning to forest is:
- a) primary succession
 - b) secondary succession
 - c) neither of these
63. The _____ model of succession states that during succession, one species creates an opportunity for a different species to be successful, and this continues until a species becomes the site dominant. (Fill in the Blank)
- (a) facilitation
 - (b) inhibition
 - (c) tolerance
 - (d) a & c