Answers to Practice Quiz for Labs 1-3

Slide 1. There are four species here. We need to calculate H' for these four species.

First:

$P_{hummingbird} = 3/7 = 0.43$ -------$\log_{10}P_{hummingbird} = -0.366$

$P_{tiger\ beetle} = 2/7 = 0.29$ ---------- $\log_{10}P_{tiger\ beetle} = -0.538$

$P_{fruit\ fly} = 1/7 = 0.14$ ---------- $\log_{10}P_{fruit\ fly} = -0.854$

$P_{crab} = 1/7 = 0.14$ ---------- $\log_{10}P_{crab} = -0.854$

Then:

$\log_2P_{hummingbird} = -0.366\ (3.322) = -\ 1.216$

$\log_2P_{tiger\ beetle} = -0.538\ (3.322) = -\ 1.787$

$\log_2P_{fruit\ fly} = -0.854\ (3.322) = -\ 2.837$

$\log_2P_{crab} = -0.854\ (3.322) = -2.837$

and Finally:

H' = -[-1.216 (.43) + -1.787(.29) + -2.837(.14) + -2.837(.14)] =

0.523 + 0.518 + 0.397 + 0.397 = **1.835**

Slide 2. There is only one species here.

$P_{fruit\ fly} = 15/15 = 1$

$\text{Log}_{10}\ (1) = 0$ and so H' = 0 because $P_i\log_2P_i = 0$

Slide 3. "c" is the correct answer. Remember that species richness is basically the number of species at a particular location at a particular time.

Slide 4. Graph A is useful in helping us determine if we have sampled almost all, if not all, of the species in a particular habitat. There comes a point that at no matter how many more individuals we might collect, we won't collect anymore species not previously collected. Graph B informs us about how the population of a particular species is growing over time. It is important to recognize that graph A includes multiple species but has nothing to do with population size while Graph B is all about a single species and the growth of one particular population of that species.

Slide 5. "b" is the correct answer. Choice "a" would not be correct because most organisms cannot use N_2 gas. N_2 must be converted to a different form of nitrogen before plants can use it. Also, the atmosphere is made up of 78% N_2 gas and so it seems it could never be in short supply. Go back to the end of pre-lab 2. You will see the relative percent of each gas in our atmosphere. Choices b is a density dependent factors and choice c is a density independent factor. The amount of phosphorous in the soil will determine how many plants can live in that location. How much space available will also dictate population size.

Slide 6. False. The rarefaction plot is an amalgamation of all of our data. It does not separate out for us how many individuals of each species are present.

Slide 7. False. Again there is nowhere in this graph can we separate out the number of samples. In lab you had 8 samples, but imagine if you did not know that, look at your rarefaction plots from that lab and try to determine the number of samples taken, Bet you can't.

Slide 8. One drop more than likely would not be representative of the true number of individuals in the population. We need to take many drops, then average those drops to ensure our estimation for population size is as accurate as we can make it. We hope you saw there could be quite a lot of variation between the different drops in terms of numbers of individuals.

Slide 9. They all do (Choice D). This is not meant to be a trick question, but if you go back to pre-lab 2 you will each one of the cells has mitochondria—mitochondria require oxygen.

Slide 10. Only the plant (choice A) needs carbon dioxide. Through photosynthesis they fix carbon into a form other organisms can use.

Slide 11. Choice "d" is the best answer here. Choices "a" and "b" can't be correct because pH increases in the presence of light and the photosynthetic organisms. Choice "c" is incomplete as an answer. This choice does not explain why pH decreases. Choice "d" is the best answer as there is an accurate explanation why pH decreases—organisms are respiring thus producing CO_2 which lowers pH.

Slide 12. Leaves, in general, are the primary photosynthetic structure found in plants. In order to capture as much sunlight as possible for photosynthesis, a large, broad leaf can capture more sun energy than a skinny, small leaf. What might be a disadvantage for the plant for having lots of surface area?

Slide 13. Feeding structures have a lot of surface area. This helps them capture more food. You will also see digestive systems and respiratory systems with a lot of surface area relative to their volume.

Slide 14. Structure A is the leaf. It primary function is choice "a"—photosynthesis.

Slide 15. Structure D is the stem, and so choice "a" is correct. The stem can be identified by the presence of nodes. Look in Lab 2 if you do not remember what a node is.

Slide 16. Structure C is the roots. The primary function here is nutrient uptake, choice "d". This makes sense as most nutrient occur in the soil, ergo the roots are in the soil.

Slide 17. All are heterotrophs, and so choice "E" is correct. All of these organisms feed on other organisms.

Slide 18. Removing one sand dollar form this population of sand dollars will not affect the H' value as there is only one species present. If we have 100 individuals or 99 individuals of the same species, your are still taking the log of 100/100 or 99/99 or 1, which is zero.

Slide 19. Choice "c", births must be equaling deaths if the population size is not changing. The population is being maintained at K here.

Slide 20. r-selected as this mother is about to give birth to thousands of baby crabs, most of which will not live to be reproductive themselves. So sad, isn't it?

Slide 21. Recall that the finite rate of increase was the population size at some later point in time divided by your starting population size. In this case the finite rate of increase would be choice "a", larger than 1—and more than likely much, much, much larger than 1 as she is about to hatch thousands of individuals.

Slide 22. To do this you take 0.025 and multiply it by 40 for a length of 1 mm. Recall the value of 0.025 is just a ratio. Also, this ratio will change at every magnification.