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Laboratory Exercise 3 - Pond-Water Organisms and Acidity Draft

Introduction: The purpose of this lab exercise was to design an experiment that investigated the effects of localized climate change on biological organisms. Background research included readings and videos that detailed the ways in which local environments and biological life are impacted by larger climatic trends. This experiment focused on how acidification of an aquatic environment (the pond water) would affect the organisms inhabiting it. The purpose was to simulate a scenario in which increases in atmospheric carbon dioxide (CO_2) led to the development of acid rain. Precipitation of acid rain is known to increase the acidity of marine and aquatic environments and is associated with increased pollution [1].

Methods: For this experiment, one cup full of pond-water was taken from the sample provided. Next, a four quadrants of a Petri dish were used to differentiate the location from the cup that pond water was sampled from (bottom, top, left, right). Next, using a dissecting microscope, the relative abundance of two different kinds of microorganisms from each cup location, diatoms and gastrotricha, were recorded. Then, the initial pH of both the pond water and the vinegar (pH acidity increasing agent) was recorded using paper pH strips. Then, precisely 1 drop of vinegar from the pipette was placed into each quadrant. After waiting approximately 2 minutes, the relative abundance of diatoms and gastrotricha in each quadrant were again recorded. Then, another drop of vinegar was again placed in each quadrant, and the relative abundance of diatoms and gastrotricha once again was recorded. Death was recorded as absence of movement.

Results: These results are from 1 quadrant of the Petri dish. The pH of the pond water was found initially to be approximately 8. The pH of the vinegar was found to be approximately 4. The initial count of diatoms from quadrant I (bottom of cup) was found to be approx. 200; in quadrant II (top of cup) it was approx. 75; in quadrant III (side of cup) it was approx. 20; in quadrant IV (other side of cup) it was approx. 20. The initial count of gastrotricha from quadrant I was approx. 50; in quadrant II it was approx. 15; no gastrotricha were found in either quadrants III or IV. After 1 drop of vinegar, the total living amount of diatoms decreased from 200 (quadrant I) to approx. 50; after 2 drops, all diatoms were deceased. After 1 drop of vinegar, the total living amount of gastrotricha decreased from 50 (quadrant I) to approx. 10; after 2 drops, all gastrotricha were deceased.

Discussion & Conclusions: It was clear that the increased acidity caused by the drops of vinegar caused the pond-organisms to cease normal biological functioning and die off. Acidic conditions

are known to damage cells responsible for respiration, taking an acidity of 4 or less to cause damage [2]. Such knowledge leads me to infer that the pond-organisms suffered such damage.

Literature Cited

[1] Cowen, Ryan; Tyler, Mary; Inquiry Biology: A Laboratory Manual, page 46.

[2] Cowen, Ryan; Tyler, Mary; Inquiry Biology: A Laboratory Manual, page 47.