Amanda Hart
Fall, 2003

Flatworm Experiment

Abstract-
During this experiment, the students will have an opportunity to view flatworms, and learn about their habitat. As well, they will have an opportunity to hypothesize about how they think the flatworm will change if fertilizer is added to their habitat. Students will then perform an experiment and have an opportunity to draw conclusions about the flatworms and about pollution of the waterways.

Grade level- 6th

Objectives-

*****Student will be able to demonstrate the skills needed to plan and conduct an experiment to determine a microorganism's requirements in a specific environment (6th grade science core, standard 5, objective 1, indicator a)

*Student will be able to develop a hypothesis for a question about microorganisms based on observations and prior knowledge. (6th grade science core, standard 5, objective 1, indicator b)

*Students will be able to plan and carry out an investigation on microorganisms (6th grade science core, standard 5, objective 1, indicator c)

*Students will be able to display results in an appropriate format (6th grade science core, standard 5, object 1, indicator d)

Terminology-

*****Planaria- (genus *Dugesia)* also known as the flatworm. These animals are apparently "cross eyed" and live in weedy ponds, in slow moving streams, and in the smallest creeks

*Hypothesis- students will look at what they think will happen in a certain experiment, using the data that they have, and tell why they think that this will be the outcome

*Habitat- Place where an organism lives and reproduces

*Regeneration- To be able to grow back an extremity after it has been removed

*Control Group- During an experiment, a group that is maintained without the object you are testing is the control group. For example, in our experiment the control group is the group of planaria where we don't add any fertilizer.

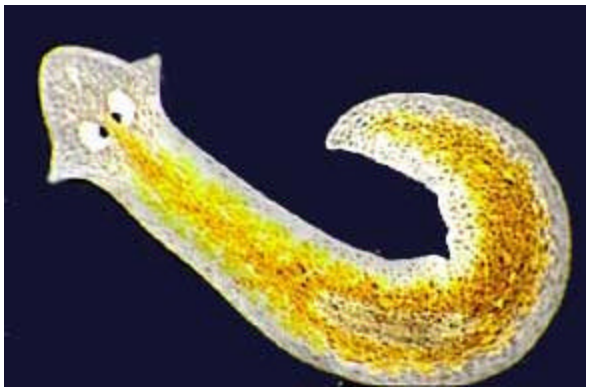
Intended learning outcomes-

*The students will be able to describe planaria in simple terms

*Students will be able to identify intolerable conditions

*Students will be able to perform an experiment, looking at the hypothesis, conclusion, the materials needed, and the procedure.

Background-



http://ebiomedia.com/gall/classics/Plan/planaria.html

Planaria belong to the phylum, Platyhelminthes, the flatworms. They are free-living, flat bodied creatures that are able to regenerate their lost body parts. They live in lakes, streams, ponds and other FRESHWATER bodies. They eat mostly decaying meat, but can also eat things like hard-boiled egg yolks when in captivity. They are a simple life form, including a brain, muscle bundles, an internal reproductive system, a blind gut, and an excretory system. They can be conditioned to learn, and have been known to be able to master a two choice maze. They do this because they have the ability to transfer information from one individual to anther. They like to be kept at a temperature between 68 and 72 degrees Fahrenheit. They are sensitive to extremes of light, temperature, and pH levels. (http://ebiomedia.com/gall/classics/Plan/planaria.html)

Fertilizers create many problems in streams ecosystems. Fertilizers are classified as a part of urban runoff. Urban runoff can also include things like pollution from cars, pesticides, and herbicides. Urban run-off contains a toxic mixing of cancer-causing chemicals such as hexane, cyclohexane, benzene, polycyclic, formaldehyde, methanol, acrolein, acetaldehyde, lead, and many others. These chemicals have been shown to cause cancer, birth defects, and immune suppression in humans. These same problems occur in the fish, birds, and other animals that have made the stream their home. As well as the aforementioned problems, many aquatic creatures cannot tolerate the advanced levels of nitrogen (what fertilizer is made of) and cannot survive. (http://chamisa.freeshell.org/pollution.htm)

Total time- 1 hour the first day
48 hours wait time
1 hour the second day

Materials-

*One microscope between every four or five students
*One slide of a dead planaria for each group

*Fertilizer/water mix (1 fertilizer piece to 3 cups water)
*A dropper
*48 planaria for each group
*12 cup muffin tin for each group
*Paper towel for spilled water

Prior knowledge assessment-

*Review with the students the procedures for using a microscope
*Review the different parts of an experiment (the hypothesis, materials, procedure, conclusion, and a control group)
*Review what it means to take an average
*Because this is the introductory lesson, as long as this basic knowledge is intact, you can proceed with the lesson, because everything else they need to know will be explained. However, if they are struggling with these concepts it is an opportunity to review these concepts so that you can proceed with the lesson.

Instruction-

*Ask each student to tell what keeps something alive. Answers should include things like water, food, a place to live, air, etc. Make a concept map of the things they mention
*Discuss what a planaria is, and what they need to live, as well as their special ability to regenerate
*Discuss what a habitat is
*Break the class into groups of 4/5 students. Give each group a microscope, and a slide with a dead planaria on it.
*Have them each record observations on a piece of paper, including drawings, color, and any other things that they find notable
*Reconvene, and discuss the observations that each group made
*Ask them what they think might be harmful to the planaria
*Tell them that we are going to do an experiment involving fertilizer and planaria.
*Each group should get a muffin tin, 48 planaria, a cup of the fertilizer mixture, and a dropper
*Tell them to put 4 planaria in each cup
*The first row of three should be the control group, and should not get any drops of the fertilizer mixture
*The second row of three should get 4 drops of the mixture
*The third row of three should get 5 drops of the mixture
*The fourth row of three should get 6 drops of the mixture
*Have the students hypothesize about what they think will happen to each row
WAIT 48 HOURS
*Reconvene, and have the students count how many dead planaria are in each cup
*They should make a chart about their findings.
*Have them average the dead planaria to find an average dead compared to the drops
*Have a discussion about their hypotheses
*Ask them how they think fertilizer gets into streams and lakes in the wild

*Ask for the implications of putting fertilizer on the grass around the streams

*On the same paper as their hypothesis, ask them to write a conclusion about what they have discovered

Processing-

*Discuss with the students the implications of having too much fertilizer in streams. Possible answers could include that the fertilizer and urban runoff could ruin the ecosystem, that the animals will die and will have an effect on us, the stream could be too toxic for humans to interact with, etc.

*Discuss why this experiment is important

*Discuss what we can learn from this experiment about our own way of living

Assessment strategies-

*Look at the numbers that they came up with for their number dead compared to their drops. Evaluate their ability to perform an experiment by their results

*Listen to their hypotheses and conclusions, and conclude if they have gathered any new information by a comparison of their hypotheses and conclusions

*Read their hypothesizes and conclusions

*Look at their initial observations of planaria

*Have them formally write-up the experiment in their lab notebooks. Specifically look for things that you reviewed, such as hypothesis, control group, procedure, etc.

Future connections-

*Have the students come up with an experiment to test another life condition of planaria. They need to design, execute, and write up a formal sheet about it.

*Have them write a letter to their state representative expressing their new environmental awareness, and what they think should be done. MUST INCLUDE A PLAN OF ACTION

References-

*http://ebiomedia.com/gall/classics/Plan/planaria.html
*http://chamisa.freeshell.org/pollution.htm