The Nucleus

Official Quarterly Newsletter of the Texas Association of Biology Teachers

Volume 19, Issue IV **Fall, 2006**

President's Message:

Twenty-three members of TABT gathered for a refreshing and educational weekend in Port Aransas on September 15-17, 2006. Our mini-conference was held at the University of Texas Marine Science Institute. Given that UTMSI is open for student groups, you may want to know more of the details of our event. Rick Tinnin and John Williams of UTMSI provided a well-paced, organized experience for our group. Saturday morning began with an excursion on the research vessel, *Katy*. During our 4-hour boat trip, we performed a plankton tow, a mud grab, and a trawl. Rick and John took the time to identify the organisms, explain their specific adaptations and their role in the food web of the area. The afternoon was spent looking at plant adaptations to salt marsh life and touring the salt marsh. Our evening was topped off with a presentation by Dr. Ed Buskey who spoke to us about copepod escape behaviors. Dr. Buskey's entertaining presentation included a vivid, first-hand demonstration of copepod bioluminescence. Sunday morning was filled with a productive sharing of ideas as we conducted a teaching activity swap-shop.

The food, facilities, and faculty of UTMSI were great. I recommend it as an ideal place to provide students with a first-hand experience in the biology of the marine ecosystem. If you are interested in taking a group to this facility you should contact Rick Tinnin at ***tinnin@utmsi.utexas.edu*** or (361)-749-6703. We would like to say a Texas-sized thank you to our president-elect, Jennifer Jordan for organizing this event!

Let me take this opportunity to give you a brief update on several items relevant to teaching biology in Texas.

TEKS revision comments are being sought by STAT: I encourage each of you to go on line to provide input to STAT regarding the changes being recommended by the STAT TEKS revision committee. The proposed changes and comment form can be accessed at ***http://www.pflugervilleisd.net/curriculum/CPrints/science/statteks.html***. This is an opportunity for your voice to be heard with regard to what you would like to see changed in the TEKS documents for the courses you teach. The deadline for submitting your comments has been extended to December 7, 2006.

End-Of-Course Biology Test in May, 2007: Another piece of state-level news is the up-coming end-of-course test for biology. A biology end-of-course field test will be taken on-line by all students enrolled in the first year biology course. The window of time during which the test will be administered is April 23-May 18, 2007. I encourage you to contact your testing coordinator to make sure your school has a plan in place for this testing event. For some school districts this may require some intricate scheduling of computer use given that an end-of-course field test in geometry will also be given during the same window of time.

CAST: TABT held our annual business meeting and luncheon during CAST in Wichita Falls. Franklin Bell of St. Mary's Hall in San Antonio was recognized as the 2006 Outstanding Biology Teacher Award recipient. In addition, Benjy Wood was elected to the position of president-elect. Our luncheon speaker, Dr. Fred Stangl, gave a humorous and enlightening presentation of his research with small mammals of the plains of Texas. Each attending member received door prizes thanks to the leg work of our incoming president, Jennifer Jordan and the support of many supporting science suppliers.

TABT welcomes our new slate of officers for 2007. Our president will be Jennifer Jordan. Kristin Martin will complete a second year as our secretary/treasurer and Benjy Wood is our president-elect. As out-going president, I look forward to serving our organization as past-president. It has been a privilege and pleasure to have served as your 2006 president.

Debbie Richards,
TABT President

In this issue ...

A Magnetic Karyotype

Michelle Barnet (*mbarnet@banderaisd.net*)
Bandera High School, Bandera, Texas

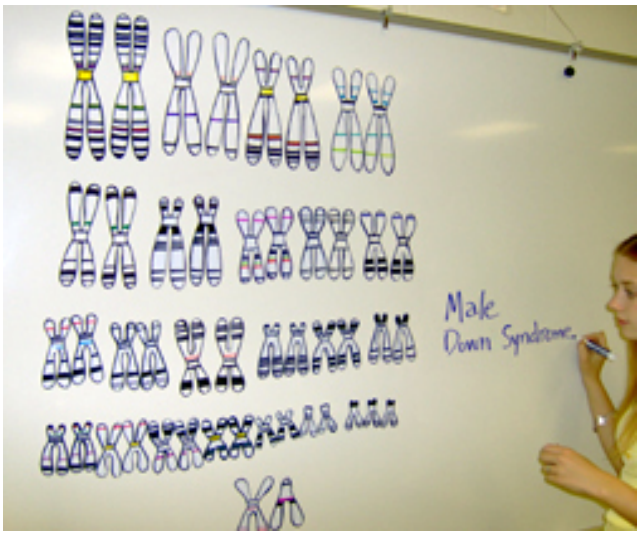
Introduction:
Many of us have used the "cut and paste" karyotype activity when teaching introductory genetics to our first year biology students. While the cutting and pasting keeps our students busy, it seems that we spend more time clipping chromosomes and passing the glue than understanding the basic concept of normal and abnormal karyotypes. This activity uses a large set of magnetic whiteboard chromosomes that can quickly represent karyotypes.

Objective:
The learner will be able to identify and analyze karyotypes.

Materials Needed:

- White Magnetic Sheets (Large 8" x 11") sheets can be obtained from Flinn Scientific, Inc., or any craft store
- Permanent markers in a variety of colors, including black
- Scissors
- Computer and Printer (optional)

Preparation Instructions:
Several good representations of karyotypes can be found on the internet, and sketched as an entire set of magnetic chromosomes, with the largest pair, Chromosome #1, about 12" high. The size of the other chromosomes can be adjusted accordingly, and banding can be included so that the pairs could be matched. You may wish to include extras of some chromosomes, such as Chromosomes #21 (to represent Down syndrome), and additional X and Y chromosomes for abnormal karyotypes. Permanent markers in a variety of colors can be used for the banding patterns, though a good black permanent marker will work well to define the edges. The magnetic sheet (also called magnetic paper) can also be put through a computer printer, so any set of chromosomes could be prepared if a suitable picture of a karyotype is found, and the size of the chromosomes can be changed, too. If a human karyotype is too great an undertaking, smaller sets of chromosomes could also be fashioned, such as fruit fly chromosomes, etc.



Suggestions for Classroom Use:
Leave the chromosomes on the corner of the whiteboard and each day add a few new chromosomes, or remove some, to create various types of karyotypes. One or two students can volunteer to match up the chromosomes, and the analysis of the finished karyotype written on the whiteboard.

FRANKLIN BELL
2006 TEXAS OUTSTANDING BIOLOGY TEACHER
NATIONAL ASSOCIATION OF BIOLOGY TEACHERS

The National Association of Biology Teachers, in conjunction with Prentice Hall Publishing Company and the Texas Association of Biology Teachers, is pleased to present Franklin Bell with the 2006 Outstanding Biology Teacher Award. This award, given annually since 1961, identifies a teacher from each of the United States, its possessions, Puerto Rico, the District of Columbia, and Canada who has made valuable contributions to the profession and to his/her students. Criteria for the award include teaching ability, experience, inventiveness, initiative, inherent teaching strengths, and cooperativeness in the school and community.

Franklin Bell is Science Department Co-Chairman at St. Mary's Hall in San Antonio where he teaches AP Biology, Zoology and Genetics. He also frequently teaches summer field-work courses for students, taking groups of them to such exotic locations as Hawaii and the Galapagos Islands. Franklin has been teaching biology for the past 21 years, the last 10 of which have been in San Antonio.

In addition to being an exemplary teacher, Franklin continually contributes to his profession, school and community. He is a popular consultant for the College Board, conducting numerous summer institutes, as well as 1 and 2 day workshops. He is also an active member of many professional organizations, including NABT, TABT, and NSTA. Furthermore, Franklin is a Scoutmaster and is especially active as a volunteer swim meet official.

In describing his teaching, Franklin reflected that "Whether I am slogging through a salt marsh teaching about wetlands or in the classroom discussing the heat capacity of water and where the energy of hurricanes comes from, I am truly enjoying myself. I truly love teaching biology."

From the comments of both students and colleagues, it is obvious that Franklin's students and colleagues all love learning biology from him. His co-chair says that "Franklin Bell is an innovator. He is constantly looking for new ideas, new labs, new ways to do things…When he finds an idea he is more than willing to share it. In fact, just today he invited everyone in the department to come over to his class to watch the fertilization of sea urchin eggs." A former student, now a biomedical engineering major at Duke, in an enthusiastic letter of support, fondly recalled his class. She gave several examples of the impact of his teaching, including the following, "When we studied metabolism, sugars and the ATP cycle, he pointed out, based on the structures of sucrose and fructose, why a banana will help an athlete recover more quickly than a candy bar. Ever since, I have checked al my sports drinks for the relative positions of fructose and sucrose on the ingredient lists." Finally, the parents of two former students summed up their support by stating that "he has demonstrated the difference between a teacher who simply teaches what he knows and a teacher who loves what he teaches."

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Adopt-A-Plot Ecology Project

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Tyler, Texas

Some notes about the project will be helpful if you try this project in your classes. This project is a blessing at the end of the year. Kids get to do something outside; they have some freedom during their lab days in class, but have plenty of interesting work to keep them occupied. The project allows them to do something very different from the other projects during the year (You will discover some great artists as well as some future entomologists and botanists.), ***and*** students must to work together to get the final product completed. I would typically have the project due the day before our bell-to-bell final exam review. Once students turned in the project and wrote out their evaluation of their partners (They determine part of each other's grade!), we finish up with an ecology video (from ***National Geographic*** or ***Nature***.

A rain gauge is easy to make from a plastic fruit fly vial that has fractional marking in permanent marker on the sides. Be sure the students know to place it is an open area, not under trees.

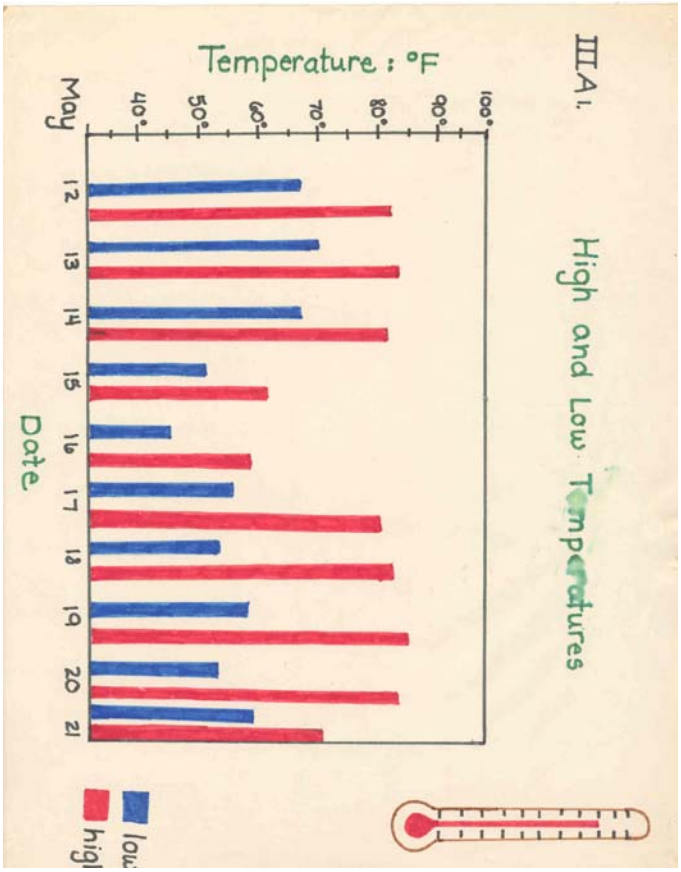
Having good field guides and ID books is important in assisting in identification. If you don't have your own set, work with your librarian to build up a collection. Display samples of mounted and correctly labeled plants as well as several types of insect collections to illustrate different mounting methods.

LaMotte makes a soil testing kit that is not too expensive; you can also order replacement chemicals easily. Go to their website at ***http://www.lamotte.com/***. The instructions are simple (I make stations and enlarge the print for each procedure so it is easy to complete and keeps the workers moving.). Be sure the students are recording their findings as they go in a "scratch table." The final table can be neatly done later.

Try to have colored pencils, rulers, etc. for all the tables and diagrams. A selection of textbooks gives kids different ideas on the food webs and cycles.

*There are many areas that could be expanded or new ones added based on your situation – the project outline is on the next pages is just a starting point!

On the next two pages are some samples from past projects. These may be helpful to you in letting students understand the level and quality of work you expect.


IIA 1.
High and Low Temperatures
Temperature : °F
100°
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60°
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May
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13
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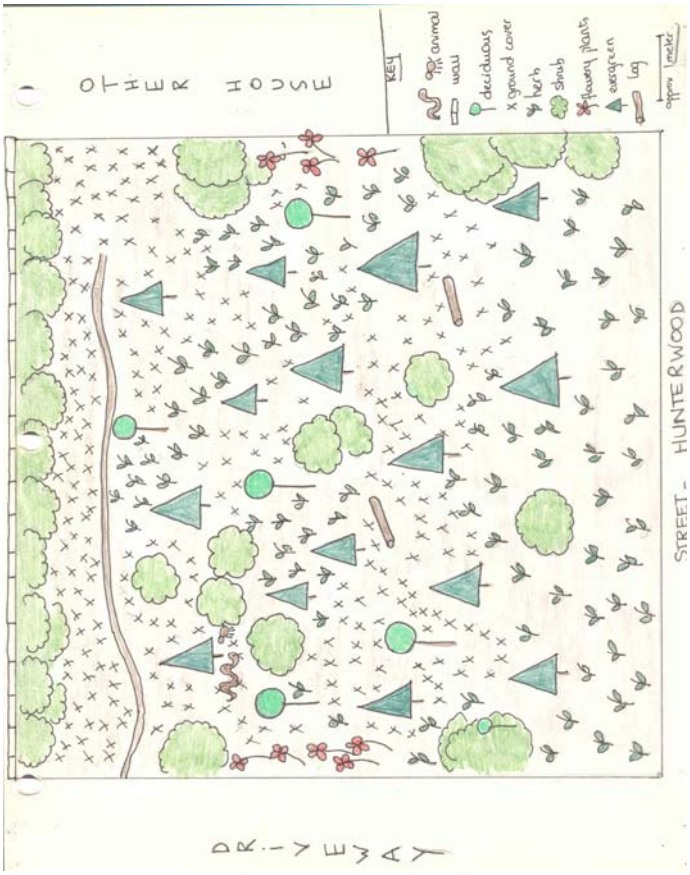
OTHER HOUSE
KEY
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wall
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x ground cover
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shrub
flowering plants
evergreen
log
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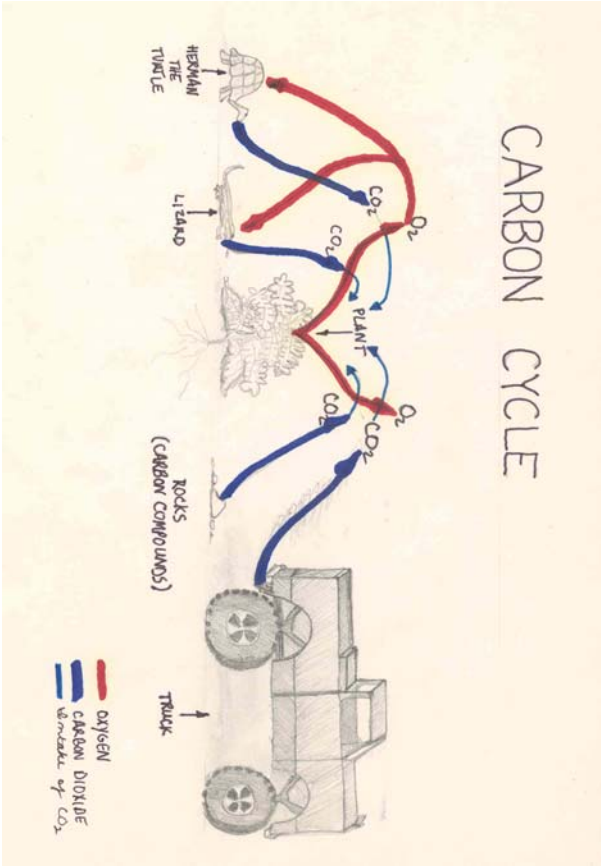
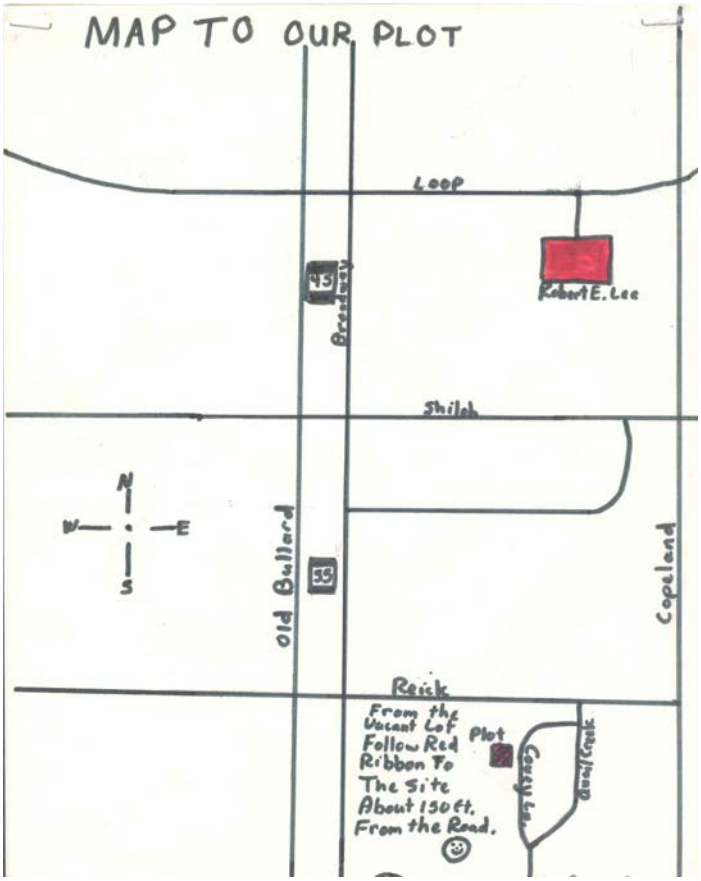
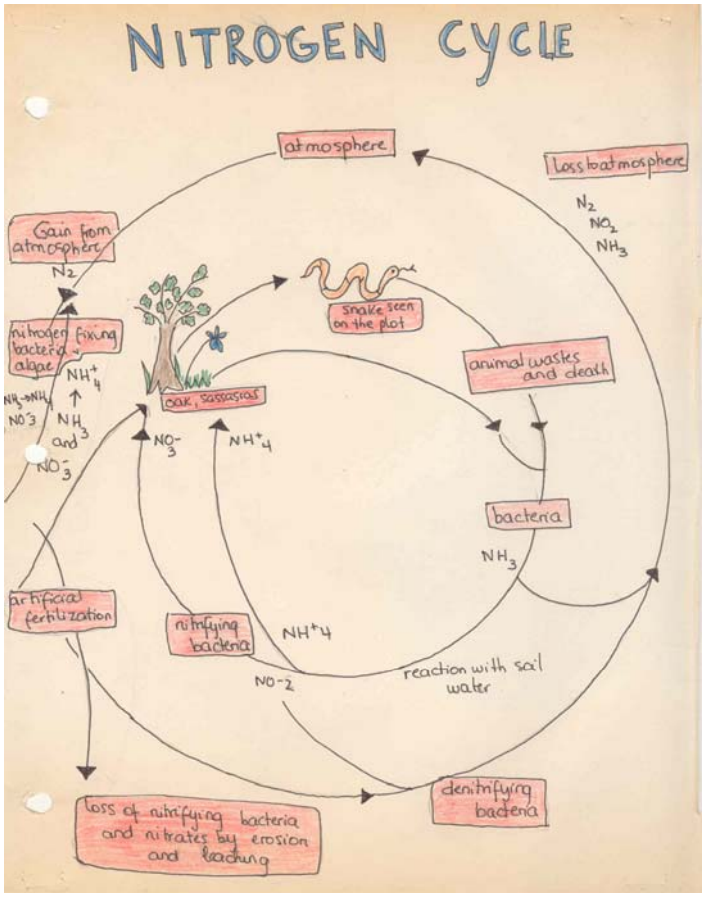
DRIVEWAY
STREET - HUNTERWOOD


CARBON CYCLE
HERMAN THE TURTLE
LIZARD
PLANT
ROCKS (CARBON COMPOUNDS)
TRUCK
O_2
CO_2
OXYGEN
CARBON DIOXIDE
(a molecule of CO_2)


MAP TO OUR PLOT
LOOP
Robert E. Lee
43
Breastwy
Shiloh
N
W
E
S
Old Bullard
55
Copeland
Reick
From the Vacant Lot Follow Red Ribbon To The Site About 150 ft. From the Road.
Plot
Corey Ln.
Hollyleaf



DAILY DIARY

date: 5/16/95 day: third day time: 4:30-5:30

observer's names: Morgan Smyrl and David Winters

weather information:

temperature: high 92 low 54

humidity : 30%

rainfall on plot: none

wind direction: south

wind speed: 5mph

additional notes on weather:

notes on plants:

Brown spots on Viginia creeper over the rocks. Cactus blooms wilted. Galls on plum trees. Sorrel turning red. Black-eyed Susans appearing. Dewberries drying up.

notes on animals:

cicadas active less insect activity saw spider's egg sac on log. Saw spiny lizard and one chameleon.

general impressions and miscellaneous observations:

Things are starting to die in the coming heat of summer

observed "pollution":

Adopt-A-Plot Ecology Project

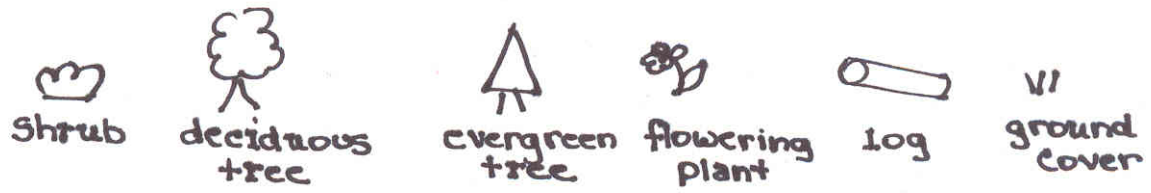
For 10 days, you will be observing the biotic and abiotic components of ecology "in the field" with your very own plot of land. Though all the visits must be made outside of class, you will have three designated lab days during which you can work on/complete many areas of your project (do the soil testing, work on charts and graphs and diagrams, and use books to identify plants and insects). Your time is valuable: don't waste these opportunities!

Group Size: minimum of 3 and maximum of 5 people
You will decide how to divide up the work. Some groups separate the jobs into 1 physical environment; 2 plants; 3 animals; 4 maps & charts; and 5 the typist who puts it all together. Other groups let each person do 1/5 the project on their own. Be sure the workload is shared fairly. Everyone in the group will receive the same project grade (major test grade), but each individual also receives a 50 point lab grade to be determined by (a) your instructor based on your work on the three lab days and by (b) your group members based on their perception of the quality of your work on the project.

Picking a Plot
Decide on a location for your 10 x 10 meter plot. It should be marked with string or boundary stakes so it is evident where your borders lie. A member of your group must visit the plot ***every day***, so make it easy to get to (around school? close to someone's home?). The plot you choose should have some trees and some less vegetated spots, some shady areas, and some sunny areas. Do ***not*** pick a yard or manicured park; you want something more natural so you will get to see many interesting things!

1. A Location Map
Your instructor will visit each plot, so your map should be a quick and accurate guide. Give directions beginning at the school parking lot and be sure to mark your plot so it can be found easily by anyone using your map. The map will be due on the first lab day of the project, and will be returned to you before the final project notebook is due.

2. Plot Map With Legend
Draw your plot outline on paper, filling in with symbols denoting the trees, shrubs, logs, large rocks, water, etc. Be sure to include a legend at the bottom of the map. Here are a few possible symbols:



3. Photos of the Plot
You must have at least three (3) titled pictures of your plot (more are acceptable, and may be helpful in the animal evidence or pollution sections).

4. Daily Diaries
For ten (10) consecutive days, keep records of (1) all the important abiotic factors affecting your plot and (2) your observations during your visits. It is suggested that you keep a "Daily Diary" form– with enough space for your records. You may submit them in the original handwritten form as long as they are neat. Your daily sheet should include the following items: day and date, time visited (Visit the plot at least once early in the morning and at least once at dusk or dark.), weather (high and low temperatures for the day, humidity, wind direction, and speed (use newspaper, TV, or Internet), rainfall (set up your marked fruit fly vial "gauge" in an open spot on your plot), plant notes (mention any specimens you collected, any observations on new growth or predation

by insects, etc.), animal notes (animals observed on the plot plus any evidence (feathers, tracks, eggshells, etc.) you find (You will use these notes to compile a final animal chart by phyla.), general impressions and other observations (Is a storm coming? Is it particularly quiet this visit? etc.), and any observed "pollution" (includes trash, etc.).

5. Abiotic Factors

Using the information contained in the daily diaries, this section should contain a graph of the high and low temperatures over the 10-day period, a graph on the daily humidity level, a graph on the rainfall measured on your plot over the 10-day period, and a light intensity map recording for one specific day and time where there was sunlight and where there was shade on your plot (One way to do this easily is make a clear plastic "overlay" on your plot map.)

6. Analysis of Abiotic Factors Affecting Plot

For each of the following, write the questions give a thoughtful answer in essay form in your project folder:

- *Hypothesize the high and low temperatures you would measure on your plot six months from now. How will that temperature difference affect the living things on your plot? Give examples.*
- *What type of biome or ecosystem does your plot seem to be a part of? What effect(s) would significant change in humidity would have on your plot? Give examples.*
- *If it rained during the project, what if any changes did you notice after the rain? Give some specific examples. If it did not rain during the project, hypothesize what effects you might notice if the lack of precipitation continued for two months.*
- *Are there important differences you notice between the mainly shady and the mainly sunny areas of your plot? If yes, give examples; if not, explain why.*

7. Soil Analysis

On one of the lab days, you will need to bring in two different soil samples from your plot in plastic bags. You will need one bag of topsoil and one bag from soil 12 inches below the surface. All the following tests should be run on both samples and all the results reported in a data table. Please follow the specific instructions for each test given in the LaMotte Soil Testing Kit. You must wear an apron and goggles and observe all safety precautions while you work. You will be testing for the presence of humus, nitrate, calcium carbonate, pH, particle size of soil, and the presence of living organisms (microscopic analysis).

8. Carbon Cycle For Your Plot

Using a textbook carbon cycle, redraw your own version using organisms and abiotic factors from your plot. Label appropriately.

9. Nitrogen Cycle For Your Plot

Using a textbook nitrogen cycle, redraw your own version using organisms and abiotic factors from your plot. Label appropriately.

10. Plant Collection

Samples of all plants growing on your plot should be collected (exceptions: poison ivy, poison oak, and bull nettle. If you are not familiar with these, observe samples on the lab bulletin board.). Plants should immediately (or as quickly as possible) be pressed between sheets of newspaper (You can also use a real plant press, easily constructed using the directions at ***http://www.kidsgardening.com/growingideas/projects/june03/pg1.html***, ***http://www.uen.org/utahlink/pond/buildpress.htm***, or other Internet sites.) and left to dry for at least 5 days. If time is short, plants pressed for only a day can be microwaved between two paper towel for about 45-60 seconds for rapid "preserving." All specimens should be "mounted" by either wax paper, contact paper, or lamination methods (See samples on the lab bulletin board to help you decide on your method.). Field guides and other resources are available at the lab station to help with identification. These can be used any time before or after school or on any of the three lab days in class. Include all your specimens, even if you are unable to

positively identify all of them.

In your project folder, write this question and a thoughtful answer to it:
"Plants are the producers of terrestrial ecosystems. Are your plants growing to their full potential, producing as much biomass as possible? If yes, what conditions are allowing this to occur? If no, what factors are limiting the growth in your plot? "

11. Master Chart of Animals Observed
Using all the animals mentioned on the daily diary pages, construct a chart showing phyla represented at your plot (Annelida, Mollusca, etc.) with the specific organisms belonging to that group listed underneath each heading. Indicate if any are listed based solely on evidence you observed, not by actual sighting (you may want to display the feathers or take pictures of the tracks, etc.). Insects need only be mentioned in general because you will also be turning in an

12. Insect Collection
Every group will be issued an insect killing jar. The poison used is ethyl acetate, much like fingernail polish remover, and when used correctly is not at all dangerous to humans (Use Internet sites such as ***http://sps.k12.ar.us/massengale/insect_collection.htm*** for tips.). After insects have been killed, they can be mounted on pins within the day (Professional insect pins are available to you at the lab station.), placed on a drop of glue, or placed between a cotton-filled lid and a piece of glass or plastic. Take a look at several different methods of displaying insects (at the back of the room) before you decide. Use guides to help you identify your insects (on the project lab days as well as before or after school). In your project folder, write this question and a thoughtful essay answer to it: *Describe several niches that insects occupy in your plot ecosystem. Why do you believe that insects are often the predominant animal group found in many ecosystems?*

13. Food Web For Your Plot
Draw your own version of a classic food web using organisms from your plot. Represent as many as possible with appropriate labels. In your project notebook, write this question and a thoughtful answer to it in essay form: *What is the dominant producer species on your plot? Describe some of the consumers who use that resource. If that producer species were to become extinct in the area, hypothesize the effect on your plot ecosystem.*

14. Symbiosis
In nature, living things rarely live isolated from other species. For each of the three major types of symbiosis observed in nature, give a written description of the relationship and illustrate an example of that type of symbiosis found on your plot.

15. Evidences of Pollution
Humans often have detrimental effects on the ecosystems around them. Using the notes from your daily diaries, discuss any evidence you have seen of pollution (anything that degrades the natural environment by human activity" and discuss what impact it has had on your plot.

Your Ecology Project will be due on _____ at the beginning of the period. Except for the insect collection and any extra materials (evidences such as feathers, etc.), all drawings, photos, charts, graphs, written questions, and the ten (10) pages of daily diary should be arranged in a notebook in the order discussed in this project handout. Your plant collection can be turned in as a separate folder or included in the notebook itself. The insect collection and extra materials will be turned in separately.

Adopt-A-Plot Ecology Project
Group Evaluation

You have just completed your ecology project. Are there any parts of it that you particularly enjoyed, or parts you especially learned a great deal from?

Were there any parts of the project that were unpleasant to you, or were there any problems you encountered that you would like me to know about?

For a 50 point lab grade, you are to evaluate every member of your group (including yourself). Grades should be based on participation and completion of project responsibilities. ***Listing yourself first***, write in all the names of your group members, the grade you think they deserve (letter grade, can use plus or minus), and any comments (which will remain strictly confidential).

Name Grade

1. _____ _____
Comments:

2. _____ _____
Comments

3. _____ _____
Comments:

4. _____ _____
Comments

5. _____ _____
Comments:

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Texas Association of Biology Teachers

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E-mail address (***very important***): _____

Type of membership: _____Active ($10) _____Student ($5) _____Retired ($5) _____Life ($250)

Please complete the following to assure balanced representation in planning TABT activities

1. Professional Class (**Check one only**)

_____Biology Teacher _____Department Chairman _____ Curator/Interpreter
_____Supervisor/Administrator _____Teacher Training _____Student
_____Other_____

2. _____Male _____Female (**OPTIONAL**)

3. Have you ever received the OBTA? ___ No ___ Yes If yes, what year? _____

4. Number of years teaching?_____

5. Organizational Class (**Check one only**)

_____Elementary _____Middle/Junior High _____Secondary _____College/University _____Zoo/Aquarium
_____Business/Institution _____Other_____

6. Special Interests (**Check no more than 2**)

___Cellular/Molecular ___Botany/Plant Science ___Laboratory Science ___Reproduction/Evolution ___Zoology
___Computer Instruction ___Environmental Biology ___Teaching Materials ___Other_____

7. I am also a member of (**Check all that apply**): ___National Association of Biology Teachers (NABT)

___National Science Teachers Association (NSTA) ___Science Teacher Association of Texas (STAT)

Please send membership application and dues to: Alton L. Biggs, TABT Records Clerk
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Make all checks payable to: Texas Association of Biology Teachers