APES- "Catching Ants with Honey"- Human Disturbance in Biodiversity
<u>Objective:</u>
To determine how varying levels of human disturbance are related to the biodiversity of ants. Students will design a controlled experiment to compare the biodiversity of ants in three areas with varying degrees of human disturbance. Students will then use the Shannon-Wiener index to quantify biodiversity.

Time: This lab will take between 1 hour and 1 ½ hours.

Materials:
- Honey diluted 1:1 with water
- Erlenmeyer flasks, 250 ml
- Disposable dropper type pipettes
- Tuna in oil
- Can opener
- Scoops or spoons
- Balances *(if students want to weigh baits)*
- Petri dishes - 1 to 3 per student depending on class size
- Markers
- Forceps/tweezers - 1 per student
- Dissecting needles - 1 per student
- Dissecting microscopes or hand lenses
- Masking tape
- Access to freezer overnight to kill ants

Background Information: In this activity, we will use ants as representative organisms to *assess the biodiversity* of our study areas. Some ants prefer sweet foods while others prefer oily foods. In order to collect as many ants as possible, we will use both a sweet bait (honey) and an oily bait (tuna in oil). As a class, we will develop a hypothesis about the relationship between the *degree of human disturbance and biodiversity.* Then, we will design and carry out an experiment to test our hypothesis.

Pre-lab: Go to the Maryland Sea Grant Biofilms and Biodiversity website:
http://www.mdsg.umd.edu/programs/education/interactive_lessons/biofilm/index.htm
You can also reach the website by Googling *"Biofilm Biodiversity."* It will be the first link on the search results page. Work through the following links from the introductory page:

Introduction
Featured Creatures
How to Calculate Biodiversity
Let's Calculate Biodiversity
Try These Data
Virtual Samples

Pre-lab Analysis:
    1.What is the difference between *species richness* and the other measures of biodiversity?

    2.What information do you need to calculate the **Shannon-Weiner biodiversity index?**

    3.Can two systems with the same *species richness have different levels of biodiversity*? If so, how?

Procedure: Write your procedures for collecting samples. You must show Mrs. Ogo before proceeding.

1. Follow your procedure to collect ants.

2. Freeze them overnight.

3. Sort and count the ants found in your Petri dishes. Sort them into species using morphoclassification—in other words, assume that two ants that look different are different species. *Hand lenses or dissecting microscopes will be helpful in the classification.*

4. Give each of your species a descriptive name *(e.g., big brown ant, little red ant).*

5. *Count how many individuals* of each species are in your Petri dishes.

6. Keep track of which ants were found in each of the three study areas *(take a GPS reading?)*

7. After you have counted all of your ants, compare your species with other groups in order to put together a class set of data.

8. Use the class data set *(and the formula that follows)* to calculate the Shannon-Weiner index for each study area. Your calculations and results should be clearly shown in your laboratory report.

10. Write a discussion of your results in your lab report. Explain what you know about the relative biodiversities of the three study areas based on your data analysis. As always, include information about anything that may have reduced the validity of your data.

Formula:
 Shannon-Weiner Index
    $H = -$ sum $(Pi \ln[Pi])$
Where:
    Pi (relative abundance) $= ni/N$
Where:
    $ni =$ number of individuals in species i
    $N =$ total number of individuals in all species

Data Table:

Species	i	ni	Pi	ln (Pi)	Pi(ln(Pi)
	1				
	2				
	3				
	4				
	5				
	6				
	7				
	8				
	9				
	10				

Write a **laboratory report** that includes the following:

Title Page (with correct title formatting)

Hypothesis- (If and then statement)

Background Information (At least 2-3 paragraphs)

Materials and Procedures (Step by step)

Data Table

Data Analysis (Show your work!)- Discuss your data and implications

Conclusion- Discuss your original hypothesis- results, what you learned by doing this lab