Name_____

DATA Nugget

CSI: Crime Solving Insects

Featured scientists: Kristi Bugajski and Paula Stoller from Valparaiso University

Research Background:

Most people think that maggots (larvae of blow flies) are gross, but they are important decomposers in many ecosystems. Without maggots, we would all trip over dead bodies every time we went outside! Not only do maggots break down dead animal bodies in nature, but they decompose human bodies as well!

Forensic entomology uses these amazing insects to help the criminal justice system. Remember the next time you swat away a fly, these little insects help police solve crimes! Adult blow flies are usually the first to arrive at a crime scene with a dead body. The blow flies **oviposit**, or lay their eggs, shortly after their arrival. These eggs hatch and become maggots that feed on the body. Scientists can use the age of the maggot to help estimate how long someone has been dead. The longer a body has been dead, the longer ago the eggs hatched and the older the maggot larvae will be.

Kristi and Paula, two forensic entomologists, were in the field one day, documenting the timing of blow fly oviposition. They noticed something unexpected! There were wasps stuck in the traps they were using to catch blow flies. The scientists wondered if these wasps would affect a blow fly's decision to oviposit. Wasps will attack adult blow flies and will also eat their eggs. Blow flies have an incredible sense of smell and sight. The entomologists wondered if blow flies are able to use their senses to detect if a wasp is near a body. If wasp detection by the blow flies is possible, they could choose to avoid the area or delay laying their eggs. The scientists predicted that blow flies would delay their oviposition when wasps were present near a body. If wasps cause blow flies to delay oviposition, this could change how scientist's use maggot age to determine how long ago a body died.

Scientist Paula using an insect net to catch blow flies in the field.

To test their hypothesis, the scientists did 10 trials in the field. They used bait cups that contained chicken liver to simulate a dead human body. A total of 9

Name_____

One of the 30 control bait cups with a large number of blow flies on the chicken liver

bait cups were used in each of the 10 trials, for a total of 90 cups. Of the 9 cups used in each trial, three contained only chicken liver, to represent a body with no wasps present. These cups were used as **controls**. Three cups contained chicken liver and a wasp pinned to the side of the bait cup so that there was a **visual cue** of the wasp. The final three cups had a crushed wasp sprinkled over chicken liver to see if blow flies could use a **smell cue** to tell that a wasp was present without seeing them. Researchers checked the cups every half hour for the presence of blow fly eggs. If they saw any eggs, they recorded the time of oviposition in hours after sunrise. They then brought the maggots to the lab and raised them to the third larval stage and identified them to species.

Scientific Questions: What effect does the presence of a wasp have on blow fly oviposition? Do blow flies use either smell or visual clues to detect wasps?

What is the hypothesis? Find the hypothesis in the Research Background and underline it. A hypothesis is a proposed explanation for an observation or a description of a pattern, which can then be tested with experimentation or other types of studies.

Name_____

Scientific Data: The entomologists were interested in determining the average number of hours after sunrise that it took for blow flies to lay eggs. The data the researchers recorded in this table are the number of flies on the bait at each half hour after sunrise. They added up each of their three cups per trial, and then added up all 10 trials.

Use the data below to answer the scientific question:

Time (Hours After Sunrise)	**Control**	**Smell**	**Visual**
6.5	1	2	1
7	0	2	2
7.5	3	5	3
8	8	4	2
8.5	1	1	2
9	3	2	2
9.5	3	0	6
10	2	3	1
10.5	1	0	1
11	1	3	1
11.5	0	2	0
12	2	0	1

	Control	**Smell**	**Visual**
Total Number of Flies			
Weighted Mean Time of Oviposition			
Standard Error*	**1.9**	**1.7**	**1.8**

** Standard error (SE) tells us how accurate our estimate of the mean is likely to be and depends on the number of replicates in an experiment and how much variation is in the data.*

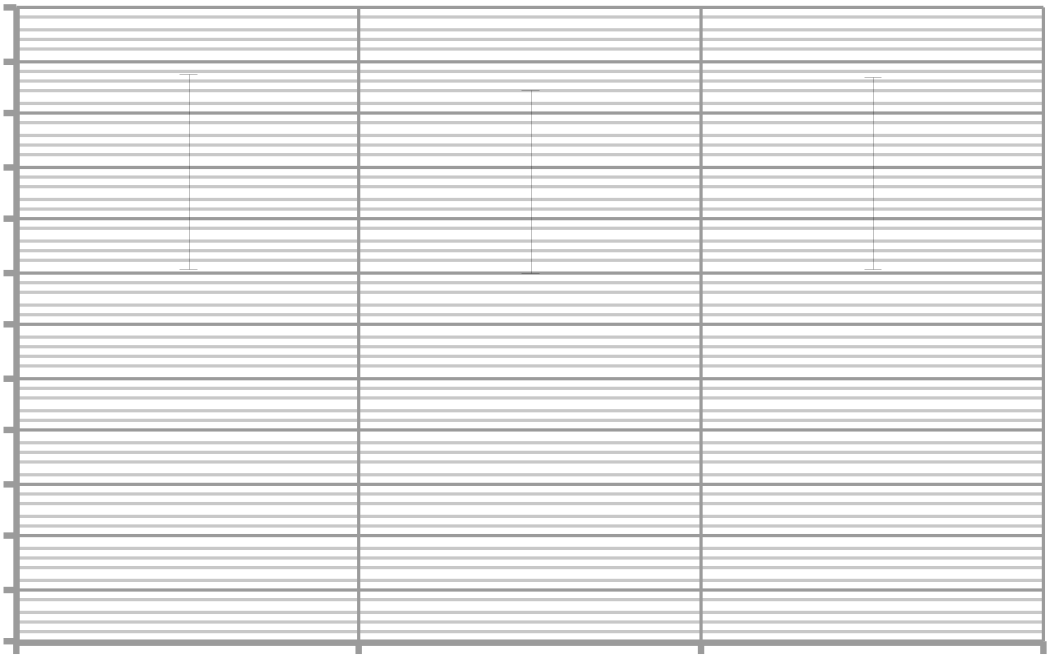
Name_____

What data will you graph to answer the question?

Independent variable: _____

Dependent variable: _____

Draw your graph below:



Interpret the data:

What trends, changes, or differences do you see in the table or on the graph?

Name_____

What is the relationship between the dependent and independent variables? What does the relationship between the variables mean?

Make a claim that answers each of the two scientific questions.

Support your claim using data as evidence. Describe the relationship between the dependent and independent variables. Refer to specific parts of the table or graph.

Describe your scientific reasoning and explain how the evidence supports your claim.

Name_____

What do the data from this study tell us about Kristi and Paula's hypothesis?

Your next steps as a scientist: Science is an ongoing process. What new question do you think should be investigated? What future data should be collected to answer your question?