Growth of a Maggot Lab

Name:

Lab Write Up

Question: Can the growth rate of fly larva be used to determine the post mortem index of a body?

Background: Once an organism dies, flies (Order diptera) are often first on the scene. The flies can be observed landing on a fresh corpse where they lay their eggs. The offspring turn into maggots who feed on the corpse. The most common flies include: Blow flies and Screw worm flies (Family Calliphoridae) are among the most common carrion feeding flies in central Ohio. Flies in the family Calliphoridae have the ability to smell death from up to ten miles (16 km) away. Hatching from an eggs in 8-12 hours, flies of this family enter the first larval stage takes from eight hours to one day. The larvae have three stages of development (called instar stages); each stage is separated by a molting event, followed by pupation. The pupae will mature and an adult fly will eventually emerge. The weather will determine the rate of development. The duration of the decay process depends on climatic conditions and reflected yearly temperature changes. Warmer temperature in summer speeded up decomposition and insect succession while low temperatures in winter retarded decay and succession by slowing down the development of dipterous larvae. Corpses decaying in the same region should have an insect succession that occurs at the same approximate rate.

The forensic importance of flies is that flies are the first insect to come in contact with a corpse. The post mortem interval is the amount of time since an organism dies. This piece of information can be used by detectives and forensic experts to determine the time of death of a body and therefore help solve a crime. Fly developmental stages should be usable to determine the duration of time since the death of an organism.

Hypothesis: If a fly larvae grows at a predictable rate due climatic factors, then the size of a fly larva collected from a different corpse in the same general location can be used to correctly predict the post mortem interval of that second corpse.

Materials:

-Fresh Dead Chicken	-Protective cage to keep animals other than insects from meat.
-Ruler	-Identification Key
-Stereoscopic Microscope	-Petri Dish
-Preservative like alcohol	-Bottle to store preserved larvae
-Maggot ID key	-Fly key

Procedure:

1. Place dead chicken in protective cage and photograph it.

2. Each day, observe the decaying chicken and collect 50+ random maggots from the surface of the chicken and place them in a sealed bottle with 50+ ml of alcohol or other preservative.

3. Repeat each day until the maggots begin to pupate. Recording the daily average temperature and time of observation.

4. Identify the maggots from each sample and measure them to the nearest millimeter. Calculate the average size for each species of maggot. Record your data

5. Graph the time in hours and average maggot size for each species you find.

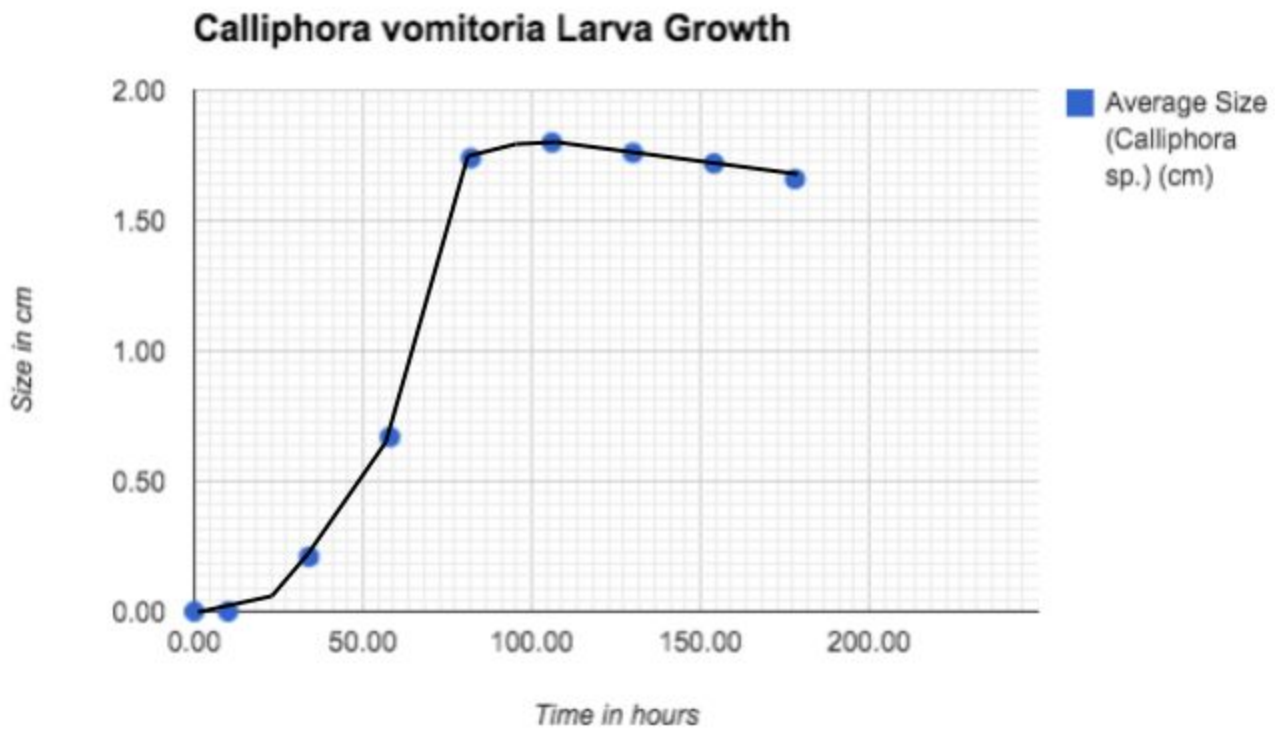
6. Obtain a sample of flies from an unknown corpse and find the average size. Use the graph to estimate the time of death or PMI.

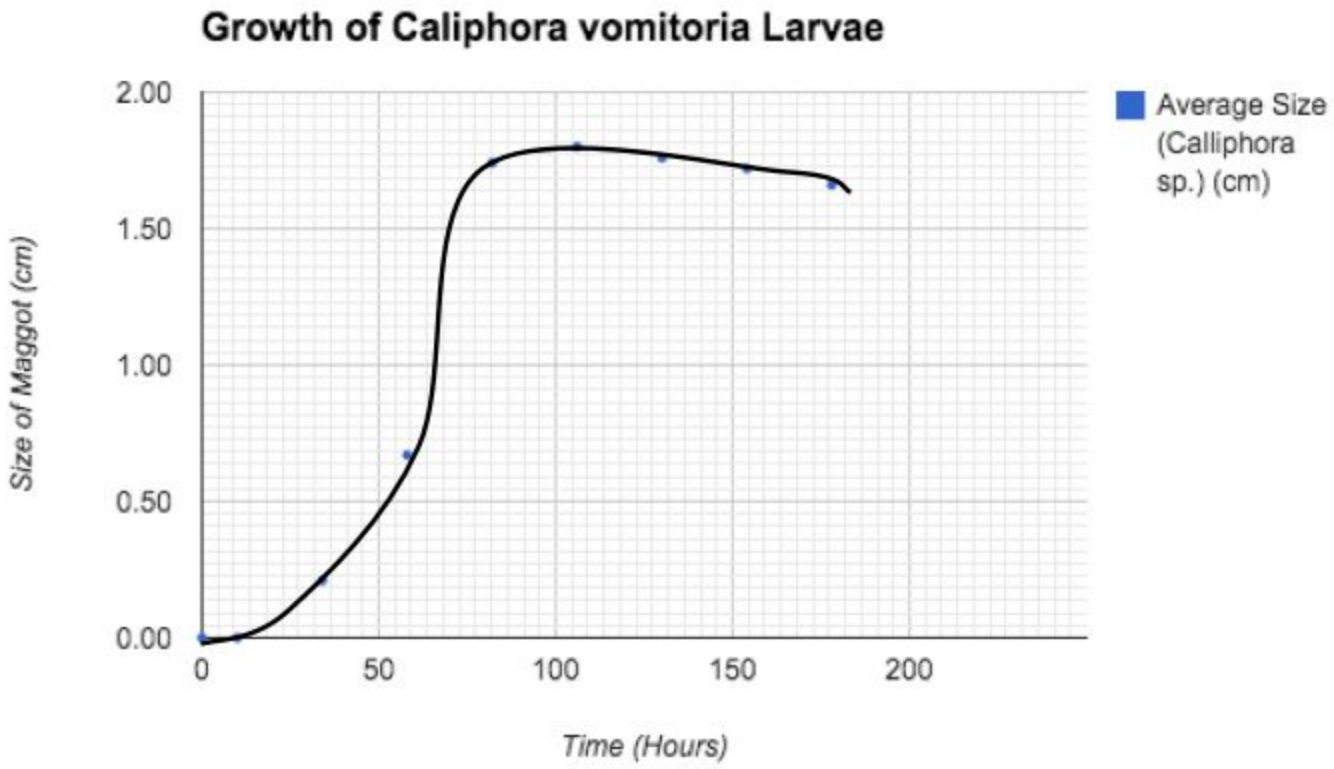
Data Table:

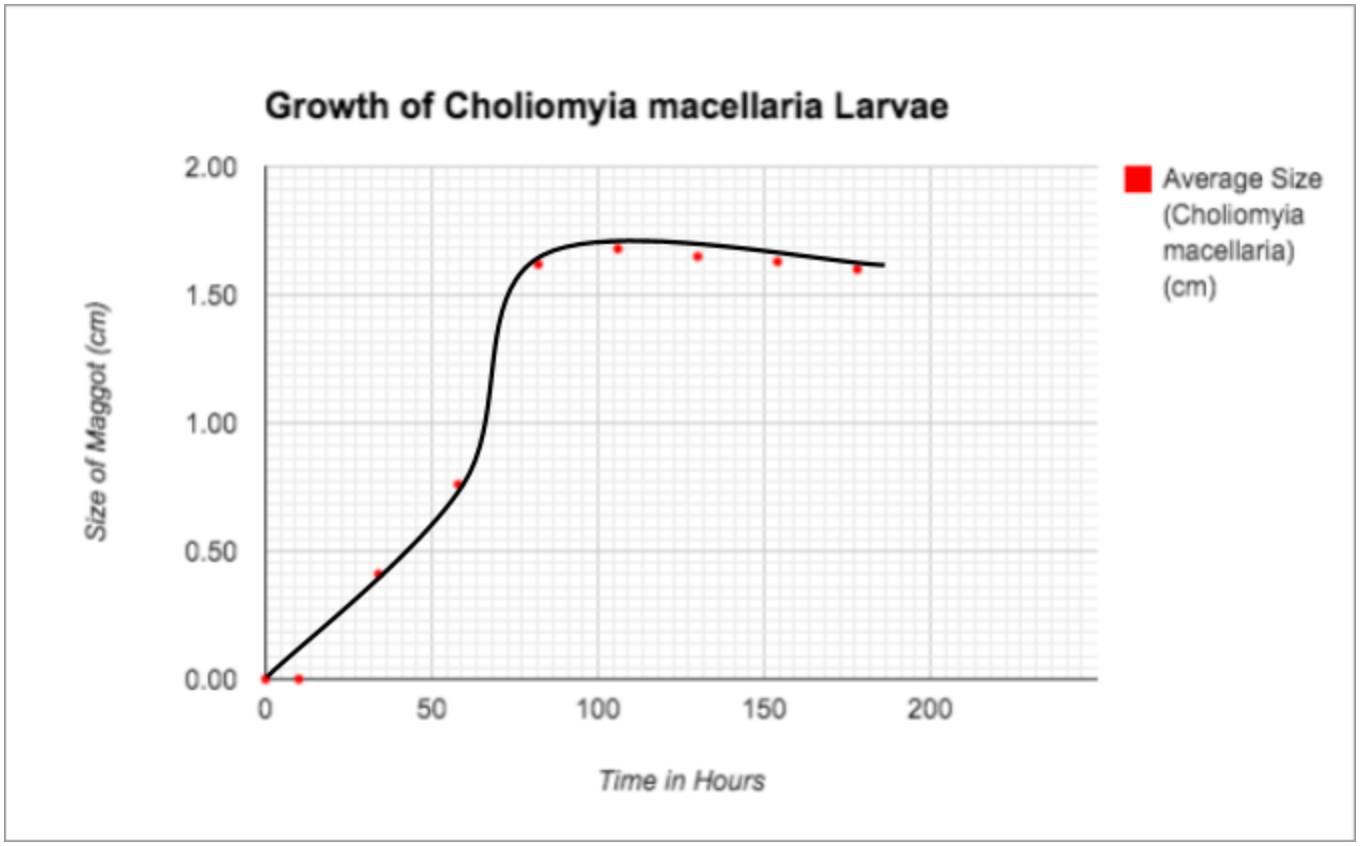
Day	Time (Hours)	*Average Size (Choliomyia macellaria) (cm)*	*Average Size (Calliphora sp.) (cm)*	High Deg C	Low Deg C	Average Temp	Note
8/25/2014	**0**	**0.00**	**0.00**	**30.55**	**21.67**	**26.11**	*** fresh dead chicken**
8/26/2014	**10**	**0.00**	**0.00**	**29.70**	**22.10**	**26.60**	*** eggs present-Calliphora vomitoria present (10-15 individuals) as well as black ants (Family: Formicidae approx 2 mm in size)**
8/27/2014	**34**	**0.41**	**0.21**	**32.20**	**21.10**	**27.22**	*** both Choliomyia macellaria and Calliphora vomtoria were present 30-50 individuals)**
8/28/2014	**58**	**0.76**	**0.67**	**27.22**	**17.78**	**22.78**	*** Bacterial action causing foam. fewer flies mostly Calliphora vomitoria. Beetles noted as well as wasps**
8/29/2014	**82**	**1.62**	**1.74**	**30.55**	**16.11**	**23.30**	*** foaming continues**

8/30/2014	**106**	**1.68**	**1.80**	**33.89**	**21.10**	**27.78**	*** foaming continues -soft tissue liquifying**
8/31/2014	**130**	**1.65**	**1.76**	**27.88**	**22.60**	**25.50**	*** liquid from rain added to soft tissue, bones are loose, many maggots dead in liquid at bottom of cage.**
9/1/2014	**154**	**1.63**	**1.72**	**30.55**	**22.77**	**26.62**	*** liquid is thick like gravy, maggot activity decreasing, more beetles present. Fly activity has stopped.**
9/2/2014	**178**	**1.60**	**1.66**	**27.90**	**20.42**	**24.40**	*** Sour smell increasing, no flies, maggot populations are dropping off.**
							*** several fly pupa are visible.**

Graphs:




Growth of Caliphora vomitoria Larvae
2.00
1.50
1.00
0.50
0.00
0
50
100
150
200
Size of Maggot (cm)
Time (Hours)
Average Size (Calliphora sp.) (cm)


Growth of Choliomyia macellaria Larvae
2.00
1.50
1.00
0.50
0.00
0
50
100
150
200
Size of Maggot (cm)
Time in Hours
Average Size (Choliomyia macellaria) (cm)

Unknown:

Laughbaum's classes Maggot Data from 8/29				TEMPERATURE at carcass: 33.9dC
length (mm)	species scientific name		length (mm)	sp
7.4	C. vomitaria		8.5	C. macellaria
7.0	C. vomitaria		6.0	C. macellaria
8.9	C. vomitaria		8.0	C. macellaria
7.0	C. vomitaria		6.0	C. macellaria
9.2	C. vomitaria		9.5	C. macellaria
4.0	C. vomitaria		7	C. macellaria
5.0	C. vomitaria		6.2	C. macellaria
9.2	C. vomitaria		7.2	C. macellaria
10.1	C. vomitaria		11	C. macellaria
4	C. vomitaria		7.7	AVERAGE
5	C. vomitaria			
6.3	C. vomitaria			
5.9	C. vomitaria			
6.3	C. vomitaria			
5	C. vomitaria			
10	C. vomitaria			
10	C. vomitaria			
5.5	C. vomitaria			
12	C. vomitaria			
4	C. vomitaria			
8.5	C. vomitaria			
7.2	AVERAGE			

Analysis: Estimate the PMI-Based on your data and defend your answer.

Conclusion: (See Rubric)