 Nature’s Witness – Forensic Entomology Lab

Read through the **“Investigation”** scenario presented in the lab manual.

You will be filling the role of a Forensic Entomologist for this crime scene.

**Question**: What is the post mortem interval (PMI) of the two victims?

**Knowledge Probe:** Use the information you’ve learned thus far this unit, information from the chapter, or from the background lab reading to answer the following questions:

1. What is the role of a forensic entomologist in a homicide investigation?
2. Why are insects important when determining post mortem interval?
3. What is an instar?
4. How can you distinguish one instar from the others?
5. Flies develop at predictable rates. What measure is used to make this prediction?

**Investigation Plan**:

Part 1

1. Examine each of the life stage exemplars of Species A and Species B, and record in your OBSERVATIONS the key features of the specimen that distinguishes it from other stages AND from other species.
2. After viewing a specimen, return it to its appropriate vial**, being careful not to mix up the samples**.

**Observations Part 1**:

List the key features of the specimen that distinguishes it from other stages AND from other species.

|  |  |  |
| --- | --- | --- |
| **Fly Stage** | **Species** | **Observations** |
| Eggs | Species A |  |
| 1st Instar Larva | Species A |  |
| Species B |  |
| 2nd Instar Larva | Species A |  |
| Species B |  |
| Feeding 3rd Instar Larva | Species B |  |
| Migrating 3rd Instar Larva | Species A |  |
| Species B |  |
| Pre-pupa | Species A |  |
| Pupa | Species B |  |
| Adult | Species A |  |
| Species B |  |

**Investigation Plan**:

Part 2

1. You will be assigned one specimen from either the female victim or the male victim. Record which victim you were assigned, give a description of the specimen and a drawing/sketch of your assigned specimen.
2. Use the Dichotomous Keys in your Lab Manual, as well as your observations from Part 1 to identify the SPECIES (A or B) and LIFECYCLE STAGE of your sample. HINT: Species A is a BOTTLE FLY. Species B is a FLESH FLY.
3. Once you have determined the species and stage, record your information in the class data table.

**Observations**

Part2

Victim (male or female): \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Description of my assigned specimen: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Drawing of my assigned specimen:

Lifecycle stage (egg, 1st instar larva, feeding 3rd instar, etc…) of my sample\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Species (A or B) of my sample\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**Investigation Plan**

Part 3

Cumulative Degree Hours for the Flies

1. Determine the number of degree hours required for each life stage of both species. To do this, multiply the number of hours required for the stage by the degrees Celsius given in the table.
2. Calculate the cumulative degree hours required to reach each of the stages by adding all of the degree hours together.

Cumulative Degree Hours for Each Day (tape in table into your notebook under Observations)

1. Use the Weather Service Data provided to determine the number of degree hours for each day. To do this, multiply the average temperature for the day by 24 hours.
2. Calculate the cumulative degree hours for each day by adding the cumulative degree hours of the last day to the degree hours of the previous day.

Determining Day of Insect Colonization

1. Determine the MOST ADVANCED insect lifecycle stage for each species found on the victims. Write these in your Observations.
2. Use your cumulative degree hours for the flies and cumulative degree hours for each day to determine the earliest possible day of insect colonization (when eggs were laid on the bodies).

**Observations**

Part 3

Species A

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | Time to Reach Each Stage - Hours | | | | | |
| Temp. = 21°C | Egg | 1st Instar Larva | 2nd instar larva | Feeding 3rd instar larva | Migrating 3rd instar larva | Pupa |
|  | 21 | 26 | 31 | 50 | 118 | 240 |
| Degree Hours |  |  |  |  |  |  |
| Cumulative Degree Hours |  |  |  |  |  |  |

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | Time to Reach Each Stage - Hours | | | | | |
| Temp. = 21°C | Egg | 1st Instar Larva | 2nd instar larva | Feeding 3rd instar larva | Migrating 3rd instar larva | Pupa |
|  | 25 | 31 | 37 | 60 | 124 | 286 |
| Degree Hours |  |  |  |  |  |  |
| Cumulative Degree Hours |  |  |  |  |  |  |

Species B

Most advanced fly stage – Species A = \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Most advanced fly stage – Species B = \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

|  |  |  |  |
| --- | --- | --- | --- |
| Day | Average Temperature °C | Degree Hours | Cumulative Degree Hours |
| 1 | 16.1 |  |  |
| 2 | 15 |  |  |
| 3 | 12.8 |  |  |
| 4 | 13.3 |  |  |
| 5 | 19.4 |  |  |
| 6 | 20.6 |  |  |
| 7 | 19.4 |  |  |
| 8 | 16.1 |  |  |
| 9 | 18.9 |  |  |
| 10 | 16.1 |  |  |
| 11 | 15.3 |  |  |
| 12 | 10.5 |  |  |
| 13 | 12.1 |  |  |
| 14 | 15 |  |  |
| 15 | 12.8 |  |  |
| 16 | 13.3 |  |  |
| 17 | 12.9 |  |  |
| 18 | 16.4 |  |  |
| 19 | 15.9 |  |  |
| 20 | 18.4 |  |  |

**Explanation**

Claim: Answer the initial question in a one-sentence statement.

Evidence: What data from this lab supports your claim?

Reasoning: What scientific/forensic-based principles support your claim?