***BENHA UNIVERSITY, FACULTY OF SCIENCE***



***ENTOMOLOGY DEPARTMENT***



**Questions are in three pages**

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| ***تمهيدي دكتورة حشرات طبية*** | ***Academic Year 2016/2017*** |
| ***الحشرات في الطب الشرعي (704 ش)***  ***Forensic Entomology (704E)*** | ***80 Marks*** |
| ***Tuesday, 22/8/2017*** | ***Time Allowed: 2 Hours*** |

1. **Write on four only from the following (20 marks):**
2. Information necessary for making an accurate prediction of time of death
3. Facts about insects can help determine if a corpse has been moved after death (postmortem movement)
4. Effect of Sun exposure on corpse decomposition.
5. Importance of Species identification in forensic cases
6. Methods usually used by Forensic Entomology in PMI determination

Forensic Entomologists use different ways in PMI determination

1. **Write the scientific term for each of the following (20 marks):**

|  |  |
| --- | --- |
|  | The Statements |
| 1 | A Stage of decomposition where abdominal wall breaks allowing gasses to escape. Carcass deflates. |
| 2 | One of the first insects to arrive at a cadaver – they prefer fresh, moist flesh. |
| 3 | They generally hide under a corpse during the daylight, and only become active at night when they enter the maggot-infested part of the corpse to capture and devour maggots. |
| 4 | Late-arriving species tend to be specialist scavengers which feed on tougher parts like skin and tendons as the body dries out. |
| 5 | The most obvious stage and tends to be the point at which a body is noticed and recovered from the water. |
| 6 | Organisms that use the corpse as an extension of their normal habitat |
| 7 | A university research facility to investigate human decomposition under various conditions in order to understand the factors which affect its rate. |
| 8 | Stiffness **or** rigidity of skeletal musclesof the corpse |
| 9 | A growth curve used to calculate maggot duration using temperature and maggot length |
| 10 | the amount of heat needed for insect growth and is useful in estimating the age of larvae in forensic cases. |

1. **Write the sign or X for each of the following statements (10 marks):**

|  |  |
| --- | --- |
|  | The statements |
| 1 | The PMI is between 8 and 36 hours When the corpse is worm and stiff |
| 2 | More fat means faster decomposition of a corpse |
| 3 | Sung T’zu (1235) is the First reference to forensic entomology |
| 4 | Databases should be developed for every region in which insects are being used to determine time of death. |
| 5 | heroin has been shown to decrease the rate of maggot's growth |
| 6 | When the corpse is cold and stiff, this means that death occurred more than 36 hours. |
| 7 | The shorter the actual PMI, the less accurate the estimate of the interval. |
| 8 | Use 70-95% ethanol or formalin to preserve specimens for morphological and molecular identification |
| 9 | The degree of putrefaction present in a body lying in the open air for one week corresponds to that found in a body after lying in the water for two weeks. |
| 10 | 'Hairy' maggots belong to pioneer flies that are purely corpse feeders. |

1. ***Write on* DNA barcoding and *its use in* forensic entomology*. (10 marks***
2. **Case study 1 ( 10 Marks)**

Calculate the heat/thermal energy (accumulated degree hour) required for each stage of the Green Bottle Fly’s life cycle.

# Table 1: ADH of the Green Bottle Fly

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| From | To | Temperature | Hours | ADH (accumulated degree hour) |
| Egg | First instar | 72° F | 15 |  |
|  |  | 72° F | 23 |  |
|  |  | 72° F | 25 |  |
|  |  | 72° F | 130 |  |
|  |  | 72° F | 137 |  |

Using the above Table 1 as the reference, answer the following:

1. How many hours does it take for a green bottle fly egg to become an adult fly?
2. For a maggot at the beginning of the second instar stage, how many hours does it take to reach the third instar if the ambient temperature is at 77° F?
3. **Case study 2 (10 Marks)**

On Saturday morning of 25/12/2016, a dead body for a woman was found in a farm with many fly adults and pupae of *Lucilia sericata*, the ambient temperature at the site was 16 °C, the maximum temp was 27 °C and the corpse temp was 21 °C. Pupae brought into the lab gave adults after 193 hours. Look at the table (table, 2) and Calculate the PMI for this case.

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Temp(°C) | Egg | Larva 1st Instar | Larva 2nd Instar | Larva 3rd Instar | Pre-pupa | Pupa | Total time (days) |
| 16 | 41 | 53 | 42 | 98 | 148 | 393 | 32 |
| 21 | 21 | 31 | 26 | 50 | 118 | 240 | 20 |
| 27 | 18 | 20 | 12 | 40 | 90 | 168 | 14 |

(Table, 2) Development rate of the blowflies, *Lucilia sericata,* (in hours) at three different temperatures are found on the following table

***With my best wishes and regards***

*Prof. Abdelwahab A. Ibrahim*