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The role of blue bottle fly in the science of crime analysis: A review

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Abstract
The aim of the present review was to investigate the evidential value of the blue bottle fly in determining the post mortem interval, the location of the crime and the specific chemicals that may have played a role in the crime as well as to highlight the benefits of utilizing the blue fly in the forensic entomology as crucial evidence in criminal crimes.

Keywords: crime analysis, Investigate, evidential, specific

Introduction: Acknowledgment

Blue flies fly (*Calliphora*), a type of flies that is characterized by blue color and feeds on rotting meat and corpses. It is a kind of cemetery fly that places eggs on the corpses and hatches larvae that feed on it, so that the environment can get rid of these corpses and then larvae turn into full insects to restore the life cycle on another corpse. Green flies, cluster flies or metal flies are synonyms for blue flies and there is a common proverb "I will not let the blue flies know the path of a jar (a place) that is, the body will be hidden well from sight and no one can reach it even the flies Blue " and it was not clear what that the popular proverb meant and the relationship between blue flies and the disappearance of people, until recently emerged the secret relationship between each other. Scientific research has recently revealed the strange ability of this type of flies, which has the ability to detect murders at a very fast through the sensor horns supplied, which resemble radio antennas smell the corpse more than three kilometers away then fly to it and lay eggs as well as has a possibility of detecting the corpse of the dead if buried near the surface of the earth, where it smells very stinky alienated all of them only blue flies to transport bacteria to the corpses to decompose and feed on them in return and wherever found corpses found this fly and reveal the corpse in minutes. The anatomy and forensic science can identify and estimate the murder process through fly blood analysis, the stages of laying egg and fly age.

Benefits of blue flies

Blue flies have a big role in the life cycle of creatures and many benefits for humans are more important than living organisms. Otherwise, earthly life may be impossible.

1. Blue flies help to decompose the carcasses of dead animals and removing its unpleasant smell through their larvae that feed on them.
2. Through the analysis of the fly blood and its accumulated stages on corpse and fly age, anatomical doctors can now estimate and determine the death time of a corpse, which contributes to the detection of murders.
3. Although the larvae feed on the meat, the same fly (adult) feeds on the nectar of flowers with a strong odor and is used in some areas to pollinate flowers, which is not harmful to humans in general.
4. The larvae of blue flies have been used in the treatment of wounds for centuries. They feed on dead tissue without affecting living tissue, which helps to heal the wounds.

Fig 1: Fly types (the most common on human remains: blue and metallic)

Species of the *Calliphoridae* family: Calliphoridae family included the Chrysomya megacephala, C.rufifacies, C. villenenvi C. negreipes C. bezzana, C. chain, Lucilia cuprina, and Hemipyrellia ligurriens species. The species of C.rufifacies and C. megacephala are the most common species in forest and urban environments while Cnegreipes are the most common species in forest areas.
Species of the Muscidae family: There are two species of Muscidae family which are Synthesiomyia nudiseta and Hydrolaea spinigera. Type S. nudiseta has been collected only on corpse found inside houses and facilities
Types of the Piophylidae family: Piophlla casei
Types of the Phoridae family: Megaselia scalaris
Types of the Stratiomylidae family: Parasarcophaga rylicornis Beetles belonging to Coleoptera: Dermestidae: Dermestes maeofqtes was found to be used in some cases.

Insectologists role in Forensic Medicine

Medical forensic insects are particularly useful in determining the post mortem interval, the location of the crime and the specific chemicals that may have played a role in the crime. Evidence collected using forensic science

And forensic medicine can be evidence that linking a person or an element to a particular area. Insects showed a great ability of endemism, which means that some insects occur in specific areas also the insects are only active in some seasons or times of the day. All these characteristics are very useful when determining the time and place of death, and the crime can be linked to the place or people or animals that are likely to enter certain insects into the corpse. The Lockard Exchange principle states that every time a person leaves or enters an area, the material is deposited or removed. Similarly, when the body was moved from the original death site, often the insects fed on the corpse are removed from that area also means that investigators can use those insects to determine the original place of death. When forensic pathologists analyze evidence, one of the basic principles they use when determining facts is animal succession. Animal succession is the behavior that insects live and feed on the corpse and forensic pathologists have used the animal succession especially to determine the post-mortem interval. It also plays a role in determining the location of death, and if some insects appear on the corpse, which is specific to a particular area will be detected the place of death and can be estimated by insect scientists when the corpse was transferred on the basis of animal succession. Insects related to the animal investigation and association include: The insects that feed on blood (Hematovagus) Haematophagus, which feed on living humans and the insects that feed on corpses (Negrophagus).

The primary insects that feed on the blood and related to the investigation are mosquitoes. If one mosquito is found on the corps, investigators can extract blood from it to make a DNA sample for up to several days after the mosquito bites the corpse. The scientists have confirmed that insects invade the corpse with different stages, and each stage has its own insects, some of them are invade the corpse at the beginning of the decomposition stage and the ones who invade after the rotting and find that the beetles invade it after it defecates and decomposes. The pathology has confirmed that the age of death can be determined during 72 hours after the death. Hence, the insect scientist can add extra dimension by studying the vital nature of the insect movement and discovering many evidence of the time of death. Insects are fed on the corpse and must be taken into consideration where the insect is located, the temperature of the place and the corpse, the date of collection, and the manner in which the collection was performed. There are four or five stages for corpse decomposition, where the association between the stage of decomposition and the type of insects and fly age. Furthermore, the science of criminal insects indicated that faster growing of larvae was achieved in the corpse that containing cocaine, and the corpse that was saved and transferred can be detected easily because the insects do not exist on them easily.

Effect of insects in the detection of death Cases

The effect of insects in the detection of death Cases can be summarized in the following points:

1. The insects begin their life after the death of the organism, in a few seconds, the blue flies that lay the eggs inside the corpse, then turn into larvae and then turn into blue flies. The death time may be determined by the fly age through knowing the type of larva or fly weight and length.
2. Regarding the beetles, its play the same role but come after the rotting of the corpse and the insects may lay their eggs in the open spaces of the corpse such as the nose, mouth, ear, and also if there are wounds in the corpse as well as the beetles was utilized in forensic science by determining whether the deceased died of drugs or not.
3. The insects are doing their work in determining the date of the crime and the murderer. If there is suspicion of certain persons who are near the crime, the flies gather around them and they know about them. Also, the insects help to know if the live persons was tortured or not as well, the deceased before his death. Additionally, in rape crimes even if it resulted in the death of the victim.
4. The role of insects in the detection of detainees tortured: This discovery is a documentation of the crimes of torture in the detention centers and that by having traces on the location of the exit of the urine of man for his inability to urinate habit, and in the case of restriction and non-movement, and also the torture of his eyes by fainting his eyes and insects ate him which this confirms that he was blindfolded during torture, which led to the erosion of his eyes, with the presence of ulcers on the genital area of the deceased and in the places where the hands and feet where insects are located on the places of ulcers.
5. Beetles were the second insect on the corpses: beetles attack decomposing corpse and come after the blue flies and is taken from the beetles and analyzed to detect if the deceased caused the death of a large percentage of heroin or died of poison.
6. Spiders and forensics: Spiders have a role in forensic science but they are invisible to the naked eye, which is called the "science of spiders of forensic medicine." Spiders come to the corpse at the last stage after the blue flies and the beetles, and by placing the spiders on the corpse is immediately recognized the death date from two sides, the first period of the arrival of spiders to the corpse after flies and beetles and the other on the age of spiders on the corpse.

Some cases and procedures in incidents related to insects

Many evidences related to the death have been discovered by insects. It is theoretically possible to determine the age of the larvae within a quarter of an hour in the laboratory. Dr. Zakaria Erzan Jokloo is one of Britain's leading forensic scientists and has contributed to resolving more than 500 criminal cases in 27 years.

The common issue that traditional criminal analysis has not been able to solve is the issue of the corpse in the covered house. Is it a crime or an accident? The corpse of an elderly man was found lying on the bed. His body was full of larvae, he had no relatives or friends, and no one knew of his presence there, except insects. Dr. Zakaria probably said that he was ill and could not take care of himself and may have been dying or unconscious, and cannot know. Question: Did he die before covering the house with wooden panels? Or after that? The police and Dr. Zakaria were in front of corpse in a closed grave, and the timing of death could mean a murder or tragic incident. Dr. Zakaria noticed that the body had larvae and a police officer asked them to sample them. A remarkable discovery was found after the larvae turned into flies. These flies are of the green

Type, not of the kind that usually exists in the houses. They do not enter the houses unless there is a corpse, but it is unlikely that the corpse was transferred from another place and there is no evidence of entry who put the corpse there, and then cover the house again, but there were certain points to enter the flies. The presence of green flies and their stages of development, from laying eggs to hatching, maturity and more egg laying, all proved that the case was not criminal, but even worse. Dr. Zakaria pointed out that the age of the larvae on the corpse proves that the lowest estimate of the time of death was undoubtedly before the date of covering the house with plates. It can also be concluded that the death occurred shortly after the house was covered with panels.

Insects can tell us the exact time of death, but their growth is radically influenced by the heat factor, so the information that give us sometimes is inaccurate. A body was found in an ammunition store and at the time it was found it had changed and many flies and larvae on it. The temperature in the lower chamber was stable and it was a thermal environment similar to the thermal environment in which the larvae were grown in the laboratory. Due to the weather, the criminal insect scientist can give accurate answers to the police because the heat was constant. The crime scene was like a laboratory which proved the accident was suicide. Furthermore, a corpse of 14-year-old boy was found in a forest and the case could be resolved if the death place was known. The forensic evidence had determined that death was not in the forest because of many of the larvae were found on the body and were in the second stage after hatching. This was an early stage. The temperature was very low and the snow was falling. The temperature remained below zero for two weeks before the corps was discovered. The flies cannot be active at such low temperatures, but the larvae can do so and this confirm that the boy was not Killed in the forest or at least did not leave his corpse outside after his death and may have stayed inside the house for a certain period came after flies green and put eggs on the corpse and then transferred to the forest.

Forensics is not only related to the larvae and killings, but there are many cases where insects can help where the presence of a kind of beetles in the amount of drugs can be through specialists who work on beetles in the museum is identified by the type and through the prior knowledge of the places of spread, the source of this drugs is determined from any country. Honolulu police found a mummified corpse for a woman who complained that the cause of death was an overdose of drugs. Traditional pathology could not find any evidence and the body was completely decomposed but the insects were able to deduce the cause of the woman's death. The corpse was found sitting watching TV that was still occupied. The forensic scientist who attended the corpse presence confirmed that the insects that consumed the body will also contain the drug that killed the woman. The criminal insect scientist took materials from the skins of beetles that consumed the body and discovered that mutual relationship. It can be concluded that the drugs kill people just like pistols and knives. Therefore, if the corpse is in an advanced state of decomposition and was attached to the skeleton, criminal forensics can tell the police whether the victim was dead as a result of the violence or not. There are many times during the determination of the presence of wounds, it is possible to know whether the Corpse contains stabs or not. When a fly finds one of the corpses, it will look for a suitable place to lay eggs, including openings such as the nose, mouth, etc. But if a person is injured by a bullet or knife stab, the fly is likely to place eggs in the wound. As a result, it is very difficult to escape the criminal crimes due to development of criminal insect science. While, the most criminals and the most people have not yet heard of criminal insects. Thus, the present review was aimed to highlight the blue fly role in detecting the death time and place of the death by interpreting the provided evidences which in turn develop the insects science and resulted in crime limitation.

Recommendations

1. Confirming the importance of insect science and it is effect on the estimating the justice file with the correct evidence.
2. Establish a new laboratory of various types of insects of criminal nature and identify their environments for each of the regions of the same country, and equipped with a bank of information such as that used for DNA or DNA.
3. Modernize the scientific police equipment and equip them with laboratories for the purpose of identifying more of the criminal insect science, which facilitates their work tasks.
4. Opening training courses in the field of criminal insectology to train, develop and increase the skills of criminal investigation workers.
5. Legislation a law that accepts insects as a criminal evidence.
6. Opening sections or people of criminal insect science in research centers and colleges of agriculture, science and medicine.

Conclusion

Insectology has developed rapidly over the past few years, and courts have begun to accept insects as a criminal guide. In the development countries there was an interest on the personal level of some forensic doctors, and through some seminars and conferences at the official level it became clear that there is no laboratory specialized in the science of criminal insects in any of the Arab countries until the preparation of this study. Therefore, the present review was to highlight the deficiency of the interest in developing the field of forensic entomology in the development countries.

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