

Role of Insects in Forensic Entomology

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Abstract

The study of insects/ arthropods in criminal investigations is referred as forensic entomology. Insects are attracted to the decaying carcass from the early stages and may deposit their eggs. Forensic scientists can determine the cause of death, the postmortem index, and any changes in the corpse's posture by examining the population of insects and their larval stages. Since they are more frequently contacted to assist in criminal investigations, forensic odontologists should be aware of the opportunities forensic entomology presents and consider using it in addition to traditional forensic investigative techniques.

Keywords: forensic entomology, insects, investigations, and postmortem index

Introduction

Forensic entomology is the application of study of insects and other arthropods in legal investigations, primarily to determine the time since death, also known as the postmortem interval (PMI), in cases of human remains (Catts and Goff, 1992). This field of science utilizes the predictable succession patterns and development stages of insects that colonize decomposing bodies to provide crucial information in criminal cases. Forensic entomology can be divided into three general areas Urban forensic entomology deals with insects that affect man and his immediate environment, such as infestations of the home. Stored product forensic entomology that Involves insects found in foodstuffs and other products that are commercially produced. Medicolegal forensic entomology focuses on the criminal aspects, such as determining the time of death, location changes of a corpse, and any signs of postmortem trauma. By studying the life cycles of insects and their interactions with the environment, forensic entomologists can provide valuable insights into various aspects of a crime scene, thereby assisting in the resolution of legal cases. In forensic entomology, insects play a crucial role in various aspects of legal investigations, particularly in estimating the postmortem interval (PMI), determining the circumstances of death, and providing other forensic insights. Here are the primary roles of insects in forensic entomology.

Estimating Time Since Death (Postmortem Interval - PMI)

Insects, particularly flies and beetles, are often the first to colonize a decomposing body. By studying the life cycles and succession patterns of these insects, forensic entomologists can estimate the PMI. This involves 1. Life Cycle Stages: Insects go through specific developmental stages (egg, larva, pupa, adult) at known rates that are influenced by environmental factors such as temperature. By identifying the stages present on a body and considering environmental data, the time since death can be estimated. 2. Succession Patterns: Different insect species colonize a body in a predictable sequence. Early colonizers, like blowflies, arrive almost immediately after death, while other species appear later as decomposition progresses. Understanding these patterns helps refine PMI estimates (Kotze *et al.*, 2021).

Key Insects in Forensic Entomology

- Blowflies (Family Calliphoridae): Among the first to arrive at a decomposing body, crucial for early PMI estimates.
- Flesh Flies (Family Sarcophagidae): Also, an early colonizer, providing additional PMI data.
- House Flies (Family Muscidae): Commonly found on decomposing bodies, contributing to PMI estimations.
- Beetles (Families Dermestidae, Silphidae, Staphylinidae): Various species colonize at different decomposition stages, aiding in refining PMI and understanding decomposition progression.

Determining Location and Movement of the Body

Insects can provide clues about whether a body has been moved after death:

Geographic Indicators: Certain insect species are specific to particular geographic regions or habitats. The presence of insects not typically found in the location where the body was discovered can indicate that the body was moved.

Environmental Conditions: Insects' development can reflect the environmental conditions of the location where they colonized the body. Differences in insect activity can suggest changes in the body's location.

Injury Sites: Insects are often attracted to wounds and natural orifices on a body. By analyzing the concentration and types of insects on different parts of the body, forensic

entomologists can identify areas of trauma and distinguish between pre-existing wounds and postmortem injuries.

Toxicological Analysis

Insects feeding on decomposing tissue can absorb and accumulate toxins, drugs, or poisons that were present in the body. Analyzing the tissues of insects, especially larvae that have fed on the body, can reveal the presence of substances such as drugs or toxins, providing information about the deceased's exposure to these substances prior to death.

Limitations of forensic entomology

Early larval stages are hardly discriminable between the species. Growth stages affected by the change in temperature, geographic location (Amendt, 2021). Forensic entomology cannot produce immediate results. Treatments (like freezing, burial or wrapping) that exclude insects can affect estimates. Chemicals can slow or accelerate growth; insect evidence may be affected by the presence of drugs in a corpse's system.

Conclusion

By leveraging the predictable behaviors and developmental stages of these insects, forensic entomologists can provide critical insights that assist in solving criminal cases, establishing timelines, and understanding the circumstances surrounding deaths.

References

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