

**Report of February 2014 Meeting  
Royal Society  
Southern Highlands Branch**

**Speaker: Assoc. Prof. James Wallman**

**Topic: The Witness was a Fly: insects as forensic detectives**

An audience of 67 greeted Dr James Wallman to hear him speak on the unusual subject of medico-criminal forensic entomology, a sub-specialty of forensic entomology. Forensic entomology is the scientific study of insects involved in matters pertaining to the law, and is best known for its use in the investigation of crimes, especially violent crimes such as murder.

Humans have been aware of the role of insects in death and decay for millennia. For example, the ancient Egyptians actively use flies in the mummification process. The first systematic treatment of carrion insects from a scientific perspective was by Megnin in 19<sup>th</sup> century France. Dr Wallman also showed works of art where flies and maggots have featured over the centuries.

Forensic entomology mostly investigates untimely human death, insects being especially useful for estimating the minimum period that has elapsed since a person's death (minimum post-mortem interval (PMI)). The two main methods for estimating min PMI entomologically are 1) determination of the stage of faunal succession in the corpse, and 2) determination of the age of blowflies found in it.

As a carcass decomposes, its insect inhabitants change in a sequential manner, a phenomenon known as succession. It is possible in principle to determine the stage in the successional sequence which the faunal assemblage represents and thus to arrive at the likely age of the corpse. Fly, beetle and other species that invade carrion have particular geographic distributions and environmental and seasonal preferences. Thus the actual species of forensic value will differ depending on the locality and the time of the year. It is therefore impossible to generalize about the details of insect succession in corpses.

The second method of aging corpses using blowflies involves first identifying the blowfly species, based on knowledge of their immature and adult stages. The life cycle of a blowfly involves egg, three stages of larvae (maggots), pupa (within puparium or pupal case) and adult. In some species, the egg stage occurs inside the female, so that she lays maggots, not eggs. Their rate of development is controlled primarily by temperature. The likely period that they could have been present in the corpse is inferred from their stage of development, thus providing the min PMI.

There are many other forensic inferences that may be made from the presence of insects. Insect evidence at the scene can provide a link to the victim or offender, such as through a victim's DNA extracted from the crop (stomach-like organ) of a maggot that has fed on the corpse when the offender has removed the body and only maggots remain. Because insects have discrete geographic distributions, when the species collected from the corpse are not characteristic of the fauna in the locality where it was discovered, they may point to death having occurred elsewhere and the body then being removed.

Dr Wallman emphasized that since evidence in forensic entomology is derived from living animals and the effect of climate, it is inherently and unavoidably variable. For example, toxicological tests on the living tissues of larvae can detect poisons and drugs from the corpses on which they were feeding. The presence of these drugs however may also alter the rate of development of fly species, thus affecting the estimate of the min PMI.

He concluded by saying that as long as forensic entomological evidence is appropriately qualified, it will remain an invaluable tool in criminal investigations and prosecutions.