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Application of Forensic Entomology to Estimate the Post Mortem Interval

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Abstract : Forensic entomology has grown immensely as a discipline in the past thirty years. The main purpose of forensic entomology is to establish the post mortem interval or PMI. Three days after the death, insect evidence is often the most accurate and sometimes the only method of determining elapsed time since death. This work presents the estimation of the PMI in an experiment to test the reliability of the accumulated degree days (ADD) method and the application of this method in a real case. The study was conducted at the Laboratory of Entomology at the National Institute for Criminalistics and Criminology of the National Gendarmerie, Algeria. The domestic rabbit Oryctolagus cuniculus L. was selected as the animal model. On 08th July 2012, the animal was killed. Larvae were collected and raised to adulthood. Estimation of oviposition time was calculated by summing up average daily temperatures minus minimum development temperature (also specific to each species). When the sum is reached, it corresponds to the oviposition day. Weather data were obtained from the nearest meteorological station. After rearing was accomplished, three species emerged: Lucilia sericata, Chrysomya albiceps, and Sarcophaga africa. For Chrysomya albiceps species, a cumulation of 186°C is necessary. The emergence of adults occured on 22nd July 2012. A value of 193.4°C is reached on 9th August 2012. Lucilia sericata species require a cumulation of 207°C. The emergence of adults occurred on 23rd, July 2012. A value of 211.35°C is reached on 9th August 2012. We should also consider that oviposition may occur more than 12 hours after death. Thus, the obtained PMI is in agreement with the actual time of death. We illustrate the use of this method during the investigation of a case of a decaying human body found on 03rd March 2015 in Bechar, South West of Algerian desert. Maggots were collected and sent to the Laboratory of Entomology. Lucilia sericata adults were identified on 24th March 2015 after emergence. A sum of 211.6°C was reached on 1st March 2015 which corresponds to the estimated day of oviposition. Therefore, the estimated date of death is 1st March 2015 ± 24 hours. The estimated PMI by accumulated degree days (ADD) method seems to be very precise. Entomological evidence should always be used in homicide investigations when the time of death cannot be determined by other methods.

Keywords : forensic entomology, accumulated degree days, postmortem interval, diptera, Algeria
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