H74 Dead on Time? The Repellent Effect of Liquid Petroleum Gas on Time Since Death Estimation

Branka Franicevic, MSc, University of Bradford, Bradford, BD7 1DP, UNITED KINGDOM*

After attending this presentation, participants will have an understanding of the impact of liquid petroleum gas may have on fly colonization, and its potential to lead to an under-estimate of PMI in tested environments.

The presentation will impact the forensic science by indicating possible variables affecting the level of accuracy of postmortem interval methods in domestic gas related deaths from a taphonomic perspective. The findings are relevant in eliminating foul play to include preventing insect colonization, or concealing a body in clandestine disposals.

The succession pattern of *Diptera calliphoridae* in the presence of chemical attractants ethanethiol and sulphur, contained in Liquefied Petroleum Gas (LPG) was observed, with an aim to investigate whether traces of a gas leak can distort postmortem interval (PMI) estimations. After attending this presentation, participants will have an understanding of the impact this type of domestic gas may have on fly colonisation, and its potential to lead to an under-estimate of PMI in tested environments.

The research will impact the forensic science by indicating possible variables affecting the level of accuracy of postmortem interval methods in domestic gas related deaths from a taphonomic perspective. The findings are relevant in eliminating foul play to include preventing insect colonisation, or concealing a body in clandestine disposals.

The transformative process of taphonomic modifications during the decomposition process is universally accepted to depend largely on ambient temperature, with an optimal condition for the development of bacteria and insect succession between 20 C° and 30 C°. Chemical attractants tested are also significantly dependant on climatic conditions with high temperatures and dry climate causing LPG to evaporate at higher speed, effectively reducing its impact on *Diptera* colonisation. The effect of LPG gas leaks on decomposition rates was assessed with hypothesis testing by statistical analysis, assuming that LPG and ambient temperature will act in unison as main factors affecting *Diptera* colonization.

LPG is commonly used in households as well as caravanning and vehicles. It is a low carbon emitting fuel, a mixture of gases primarily propane, butane with traces of ethanethiol, sulphur and mercaptan artificially added so that leaks can be detected easily. These components in domestic gas act as chemical attractants to flies, like decomposing corpses. Here, during the putrefactive process, similar gasses such as sulfur and methane compounds are released and appeal to various insects. Due to its scenting, LPG may have a repellant effect on fly attraction to cadavers during various stages of decomposition. Hydrogen sulphide alone is generally heavy with strong odour concentration and may distract the flies from the cadaver.

Field experiments were carried out on the south Croatian coast (43.02° N, 17.57° E) over a period of 30 days in June 2007, and repeated in June 2008 to confirm previous observations. Fieldwork involved comparison of decomposition pattern between samples exposed to LPG leaks, and those not affected by it, in indoor and outer environments. This was achieved by means of recording and analysing fly succession and decomposition rates at the average ambient temperature of 25 C°. The sample size comprised eight adult carcasses of *Sus scrofa* ranging from 23 to 25 kg, and eight pig livers each weighting approximately 1kg, utilised as control samples. Carcasses tested for the effect of LPG gas leaks were placed in the direct vicinity of gas bottles with the minimum leak set up, whilst control samples were positioned three meters away from the gas bottles. Sticky tapes were placed on the gas bottles, to analyse flies attracted to the chemical attractants themselves. Carcasses were kept in metal cages to minimise interference by local scavengers. Sampling, recording and observation was conducted randomly twice a day during the first week, and once a day for the rest of the experiment. Environmental data was obtained from the local Hydro-meteorological Station.

Statistical analyses confirmed that increased ambient temperature reduced the impact of a gas leak on decomposition rates in both environments (Mann-Whitney p=0.6772; p=0.6722). Statistically significant time of an average of 10 days in indoor ambient, and 7 days in outdoor setting in decomposition rates was demonstrated at an average of 20 C° (Mann-Whitney p=0.0331; p=0.41125), stated with 95% confidence. This way, the null hypothesis is accepted. The Putrefaction stage was the least affected as opposed to the Fresh stage and the late Decay in outdoor environment at an average of 27 C°. Fly succession was further statistically significant (ANOVA, Fisher test, $\alpha = 0.005$), with the maximum delay of 6 hours (S.D. = 4.1) during the Putrefaction stage at 21 C° in outer environment, and maximum of 5 hours (S.D. =3.2h) at average of 20 C° during the Decay stage in indoor settings. No general relation was found between control samples and tested carcasses with regards to the distance of gas bottles.

Variations in the rate of decomposition were associated with the gas leak and the effect of ambient temperature in both tested environments. These preliminary results demonstrate the need for further research in this area and caution when estimating postmortem interval for domestic gas related deaths, especially for subjects in advanced stages of decomposition. **Liquefied Petroleum Gas, Time Since Death, Taphonomy**

 ** Presenting Author*