Title: Critical Review of Current Forensic Literature
Subject: Medical / Nurisng
Type of Paper: Essay
Words: 1238

This review is based on the journal article; Modelling Microbial Ethanol Production by E.Coli Under Aerobic/Anaerobic Conditions: Applicability to Real Post-Mortem Cases and to Post-Mortem Blood Derived Microbial Cultures, published in Forensic Science International. The article was written by; Vassiliki A. Boumba and Theodore Vougiouklakis, who are situated in the Department of Forensic Medicine and Toxicology, Medical School, University of Ioannina, Greece; Nikolaos Kourkoumelis, who is situated in the Department of Medical Physics, Medical School, University of Ioannina, Greece; Panagiota Gousia, Vangelis Economou and Chrissanthy Papadopoulou, who are situated in the Department of Microbiology, Medical School, University of Ioannina. The article was written in the year 2013. Each author has an extensive scientific background and has been able to collaborate at the University of Ioannina, Greece.

This article has been chosen to review, as it is an up to date piece of literature with recent research. It is interesting to see how microbiology can be used forensically, it also applies chemistry, and this makes it a more interesting read as there is a range of subjects.

The article is based on how microbes can affect the blood alcohol concentration, with regards to post-mortem analysis. This is important as it is not always evident if the alcohol found in blood in a post-mortem analysis has been ingested ante-mortem or produced post-mortem. It is important to do so as the alcohol could have contributed to death, but also microbes could produce enough alcohol by-products to make it look like the alcohol contributed to death when in fact it hasn't. Either way, the blood alcohol concentration should not be wrongly interpreted. This article investigates a way the blood can be analysed to decrease the doubt of the origin of alcohol in the blood. Boumba et al. also test their findings in real cases, which makes the purpose of the investigation more relevant.

The study has a number of aims, but the main aims are to; study the production of ethanol of E.Coli (during aerobic and anaerobic conditions), to produce an equation to model the correlation between ethanol and other higher alcohols; Then to apply the findings to real post-mortem cases, to test the validity of the results.

The article only gives reference to one study that has been done in the past relevant to the investigation. It does not set the scene very well for the reader, as it does not mention that the development of the research in to the investigation. The study that is mentioned was previously done by the same authors, it is not mentioned if their work is relevant to other literature. The introduction is quite confusing as it talks about the results before they mention how their investigation took place. Table 1 is confusing as they use different units within the same table, Ethanol is measured in g/L whereas the other four alcohols are measured in mg/dl, and this does not allow the reader to easily understand the data.

The investigation uses quite complicated methods and are difficult to understand, but unless the reader specifies in microbiology this is to be expected. Despite this Boumba et al. does a good job of explaining their findings. In the discussion they explain why they use E.Coli as their choice of bacteria to analyse, this is good as it shows they have not just chosen a random bacterium just so the experiment can take place. They find that the presence of 1-Propanol and 1-Butanol indicates the neo-formation of Ethanol by E.Coli. Boumba et al. form five equations on this basis, to estimate the quantification of the production of ethanol. This is then tested on 60 post-mortem cases, each one with a positive blood alcohol concentration. The results of these tests are quite confusing, as they use a lot of statistics and don't explain them very well. For example they state "the simplest model, described by Eq. (1B) that was constructed by only two descriptors 1-propanol and 1-butanol was applied successfully in the majority of cases (26 out of 60 cases, 42%)." This is confusing as a 42% success rate is not a majority success; it appears that Boumba et al. want their research to look more successful than it actually was. The discussion about the 60 post-mortem cases is quite misleading.

Boumba et al. recognise the limitations of their research, due to the complexity of human composition and microbe involvement. They evaluate how it could be improved, by forming more equations, as they could not conclude which model was most successful in each post-mortem case, as they had nothing to compare their results to.

There are a couple of small grammatical issues, but as all the authors are Greek it is probable that a couple of sentences have been mistranslated in to English.

Laboratories need to meet specific standards to ensure any evidence analysed can still be used in court as evidence. They have to ensure the chain of custody is maintained, that evidence is not contaminated. They also have to ensure evidence from different scenes and people is kept

separate to avoid cross-contamination, as contamination could invalidate the evidence. Every specific type of evidence has to be managed in a specific way. It is difficult to manage microbes as evidence, as they are a living organism, therefore can grow and die. It is important to collect any evidence with potential microbes in a way to prevent the growth of microbes, but also to prevent their death. They should either be swabbed from a sample or stored in a poly-pot. They can then be stored at a cold temperature; this prevents growth, but does not kill the bacteria. Bacteria can be persevered for a long period of time at cold temperatures. When analysing the bacteria it is important to avoid contamination, by using aseptic techniques, as microbes are so abundant in the environment, it is very easy to have contamination. It is ensured that these standards are met by having particular controls in place.

The use of microbes, as forensic evidence is on the increase, as advances in technology are made to identify them using their DNA profile. These advances in technology, give microbiology, a large potential to link people to each other and people to objects (in cases of theft) and to specific geographical regions. The change in microbial profiles during decomposition could potentially be used to estimate the Post-mortem interval of a body. Before this can be done, standards will need to be put in to place (Gunn, 2009). Microbiologists will need to be accredited, they will need specific qualifications and experience, they will also need to be part of the forensic science society, this shows the competence of the scientist and allows evidence to be heard in court (in the Journal the authors have scientific qualifications, therefore it can be assumed that the authors are competent with what they say and the article shows the study in the best way). The laboratories will need to be validated by the UK Accreditation Service, this is an external body that checks the process of the laboratories. Quality checks will also need to be imposed; this ensures public confidence in the role of Forensic Scientists (White, 2009).

When initially reading the article, the thoughts were generally good, it was logical and the content made sense. Despite this, after analysing the article it is evidence that some of the discussions are quite misleading and need to be explained more thoroughly.