**Forensic Science Inquiry: Lords Science and Technology Committee**

**September 2018**

Written Evidence submitted by Dr Jennifer Miller and Nottingham Civic Exchange

1. **Executive Summary**
   1. This submission focusses on the need to utilise a particular forensic science technique and improve its reach and use. Dr Miller is an academic and practice expert working in stomach content analysis and argues that this method can be used to improve forensic science outcomes by greatly improving time of death estimations.
   2. Advances in techniques through Dr Miller’s research have proven its utility to improve time of death estimations and her skills have been used by a number of forces across the UK. (20-25 cases a year)
   3. Additional recognition from the Home Office and Regulator can help to improve Police Force, Pathologist, NCA and Crown Prosecution Service understanding of the techniques to improve its use in cases where it would prove invaluable additional evidence.
   4. Due to the nature of the techniques, Forensic Practitioners should be trained in the required methods to ensure they become part of the common forensic scientists’ toolkit to help improve forensic outcomes. Currently this is not the case and would be beneficial to the understanding of unexplained deaths in the UK.
2. **About the authors**
   1. [Dr Jennifer Miller](https://www.ntu.ac.uk/staff-profiles/science-technology/jennifer-miller) is module leader for Forensic Casework Examination, Introduction to Suspicious Death Investigation and the MSc module Forensic Bioarchaeology. She also teaches on Advanced CSI, Genetics for Identification and the final year Research Project whilst also acting as Year 3 tutor for Forensic Science and course leader for The Masters degree in Forensic Science. Dr Miller helps train police personnel in crime scene investigation and undertakes forensic casework UK wide, primarily in the field of stomach contents analysis, which is her main research focus, but also in the search for and recovery of human remains in problematic circumstances.
   2. Prior to working at NTU Dr Miller has worked on seven different university forensic science courses and has research links with the University of Glasgow Departments of Archaeology, Medicine and Forensic Medicine in relation to stomach contents analysis and evaluating the potential of diatoms in cases of suspected drownings. Dr Miller was also previously Head of the Forensic Bioarchaeology Unit, York Archaeological Trust.
   3. *Her research focuses on:*
      * Stomach contents analysis to determine last foods consumed, duration, timings & other events for criminal investigation
      * Gastric transit, infant formula characterisation and digestion in infancy for forensic application
      * Forensic archaeology: methods for search & problematic human remains recovery
      * Refining interpretation of non-standard & environmental forensic evidence
      * Scene examination including interpretation of taphonomy, environmental indicators of contact, duration & timings
   4. *Non-academic activity*
      * Professional Member of the Chartered Society for Forensic Sciences
      * Professional Member of the Chartered Institute for Archaeologists
      * Member of the Association for Environmental Archaeology
      * National Crime Agency (NCA) database: Recognised expert in forensic archaeology, search and recovery of human remains, non-standard evidence capture, duration and interpretation of events and stomach contents analysis (numerous Police commendations on file)
      * Home Office Forensic Archaeology Professional Standards Committee member and co-author
      * Member and Competency Assessor for the Expert Panel of the CIfA Forensic Archaeology Group
      * Member of START (Home Office Search Technology Academic Research Team)

* 1. [Nottingham Civic Exchange](http://www.ntu.ac.uk/nce) is Nottingham Trent University’s pioneering civic think tank with a primary focus on issues relating to the city and the region. Nottingham Civic Exchange enables discovery by creating a space where co-produced approaches are developed to tackle entrenched social issues. Nottingham Civic Exchange supports the role of NTU as an anchor institution in the city and the region. Nottingham Trent University holds engagement with communities, public institutions, civic life, business and residents at the core of its mission.

1. **Argument and Recommendations**
   1. Estimation of time of death can be highly problematic, relying on the interplay of a number of variable and highly individual factors. As such, the pathologist leading the post-mortem examination may only be able to assign a broad window of time within which death has occurred. This in turn means that the enquiry cannot be directed especially towards any particular narrow timeframe within the period since the deceased was last seen alive, which may be hours, days or weeks ago, or longer.
   2. One way to narrow this broad window of opportunity down to a more succinct and appropriate timescale is by the analysis of content of stomach. The identification of foods remaining within the stomach is often achievable with a high degree of accuracy, enabling the determination of type of meal consumed, individual components and even cooking methods or manner of /preparation. Dr Miller has examined and reported upon content of stomach for Police Forces UK wide and has been cross-examined under both UK and Scots jurisprudence in this respect on countless occasions. However, each case is unique, and the individual circumstances must be appropriate to make this analysis feasible, with mitigating factors such as alcohol, drugs/medication and some medical conditions affecting what conclusions may be drawn. We are currently conducting research aimed at better understanding the effects of these mitigating factors on an individual’s digestive transit. Recently, our studies have also yielded good results in the identification of nutrition applied to formula milk-fed infants.
   3. Under the correct circumstances and with appropriate underpinning knowledge, analysis of stomach content has been invaluable to suspicious death investigations on numerous occasions, helping to direct focus towards a narrower timeframe than can sometimes be achieved by more standard practices.
   4. The NCA, many senior detectives and some Pathologists are already supportive of forensic stomach contents analysis as a tool in criminal investigation. However, to progress stomach content analysis as a standard forensic tool we need all the Pathologists to get behind this; that in turn is reliant upon the backing of the Home Office and especially the Forensic Regulator. Many state registered Pathologists are innately suspicious of stomach contents analysis as a forensic tool, as they do not consider that all variables are adequately accounted for in the interpretation process. However, this is a forensic tool like any other and lack of understanding of the processes and trust in the operators is behind their reluctance to support it. Discussions and possibly a white paper including case examples would answer questions and confirm the validity of the science.
   5. Further, focused research is also fundamental to the acceptance of stomach contents analysis into the mainstream forensic ‘toolkit’. It is only by better understanding the inter-relationship between the various mitigating factors affecting digestive transit in adults and children that we can hope to extend the applicability of stomach contents analysis within forensic science. This requires a combination of background knowledge, such as is present at NTU, and funding to support the research. This funding would be far easier to obtain with the support and backing of the Regulator.
   6. Several forces request stomach contents analysis on a regular basis, including West Midlands, Police Scotland, Avon and Somerset, Devon and Cornwall, Hampshire, London Metropolitan and Thames Valley, with around 20-25 cases requested per annum from these forces. Many of the cases are tried subsequently in Crown or High Court. However, there is not universal understanding of the applicability of this forensic tool; there needs to be far wider awareness of the capabilities of it and what information it can provide for the enquiry. This is best achieved by a combination of dissemination at SIO conferences and more widespread NCA recommendation. Again, this would benefit from evidence of support by the Home Office and especially the Regulator.
   7. Ultimately, there is also a need for education to train the next generation of scientists with the correct blend of medical and scientific skills to undertake this practice. This would be achieved as a consequence of research including funding of PhD studentships.
   8. Dr Jennifer Miller is happy to speak to committee members confidentially about aspects or our research that cannot be made open to the public; she is also happy to present oral evidence to the committee or individual committee members

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**Current research collaborators**

Dr Nitin Seetohul, Senior Lecturer in Forensic Chemistry NTU, previously practitioner forensic toxicologist.

Dr Rob Morris, Research fellow, Physics (with forensic application) and MRI specialist

Prof Stuart McDonald MD, Forensic Anatomist, University of Glasgow

Prof John Cassella, Professor of Forensic Science Education, Staffordshire University