

Show Us Your Research!



2017



A Human Taphonomy Facility in the UK?

Anna Williams

University of Huddersfield, UK
a.williams@hud.ac.uk

I have made it my mission to establish a Human Taphonomy Facility in the UK. I believe that without one, forensic science in the UK is falling behind the rest of the world. There are currently seven operational Human Taphonomy Facilities (HTFs) in the USA, one in Australia and a couple opening in continental Europe this year ([Enserink, 2017](#)). HTFs are outdoor laboratories where donated human cadavers are left to decompose in a variety of conditions, so that forensic scientists can monitor how they degrade in different environments. Research conducted at the existing HTFs, and in particular at the oldest one, based at the University of Tennessee, Knoxville (USA), has given the world knowledge about decomposition that we now take for granted. We now know that the order of the stages of decomposition remains relatively constant, but the stages may overlap or not happen at all. We know that differential decomposition can happen in one cadaver, despite apparently consistent conditions. Importantly, we have also learned that humans and pigs decompose differently ([Stokes et al., 2013](#); [Alapo, 2016](#); [Hrala, 2016](#)), with has significant implications for those of us in the UK who are currently restricted to using porcine cadavers for taphonomy¹ research. Research from some of the USA HTFs has been used, with varying success, to provide expert testimony in famous court cases ([Svoboda, 2009](#); [Green and Fleeman, 2016](#); [Thornton, 2017](#)).

¹ 'Taphonomy' refers to the study of the decay of organisms and their eventual fossilisation.

The research that is undertaken at the existing HTFs, and which would be undertaken at one in the UK (if established), is designed to focus on three main areas of forensic investigation: search and location of missing individuals or clandestine depositions; identification of deceased individuals; and estimation of the *post-mortem* interval.

A Human Taphonomy Facility would allow geologists, geophysicists, botanists, palynologists and others to improve their methods of locating clandestine burials or otherwise hidden remains, through analysis of chemical changes to the soil or vegetation, for example. It would also facilitate improvements to our current methods of searching for human remains submerged in water, and our understanding of how cadavers behave in different types of water, and how this affects decomposition. Such a facility would also help to improve the training of Human Remains Detection dogs, by allowing them to use human material in different states of decomposition as training aids. Currently in the UK, these dogs are mostly trained on animal body parts, and yet are expected to find human remains operationally.

There are many human conditions or lifestyle choices that could potentially have an effect on decomposition rate, that are simply not possible to determine using animal models. This, to me, is the most important aspect of a Human Taphonomy Facility – the opportunity to study the effect of these conditions on decomposition in a variety of contexts. For example, cancer, diabetes or other conditions such as autism may help or hinder decomposition ([Buffington, 2016](#)); smoking or drug/medicine use may also have an effect on gut bacteria, which influence decomposition rate. This variation may mean that the *post-mortem* interval estimation is over or under-estimated, severely compromising the criminal investigation.

Experiments using donated human cadavers will allow research into the longevity of identifying features, such as fingerprints, iris patterns or facial shape. Current research in Australia is monitoring how facial tissue thicknesses change with *post-mortem* interval. The development of fingerprints or ‘touch DNA’ from decomposing skin is also a potential research avenue, as is the investigation of the persistence of trace evidence, such as pollen, diatoms, paint or fibres, on or near a body. There is also exciting potential for using bacterial colonisation of a body for *post-mortem* interval estimation, identification and, potentially, the reconstruction of events leading to the death of an individual. The scope of the potential research that could be undertaken at an HTF is vast.

The establishment of a Human Taphonomy Facility in the UK is understandably controversial. There are many people who think that decomposition research is undignified or disrespectful, but I view it as similar to donation to medical schools. But, there is a growing number of people who are keen to donate their bodies to forensic science and see it as a useful, beneficial alternative to burial or cremation that will directly help others after their death.

Some forensic scientists are sceptical about the value of the research published by existing HTFs around the world, citing low sample sizes for experiments and a lack of rigorous scientific technique.

If an HTF was established in the UK, I believe that it would be possible to make sure that larger sample sizes were used, through coordination and cooperation between many UK medical schools. In taphonomy experiments, especially those outdoors, it is difficult to control many variables at once, but I think that it is not impossible, and a Human Taphonomy Facility would give forensic scientists the opportunity to carry out much needed, rigorous scientific research that would be directly applicable to forensic cases involving humans in UK climatic and soil conditions.

My research has focussed on canvassing the public to hear their opinions about Human Taphonomy Facilities in general, and their thoughts on the possibility of one opening in the UK. I have created an extensive online questionnaire for gathering public opinion data. It can be found here: <http://htf4uk.blogspot.co.uk/p/our-survey.html>. Many people are surprised to hear that the UK does not currently carry out such research on donated human cadavers. I have also been vocal in the press to try to raise awareness about these facilities, in order to help lift the taboo that exists about talking about them, and to encourage the public to have discussions about body donation. I have been instrumental in proposing an HTF to the government, and am currently in contact with the Human Tissue Authority² about getting forensic taphonomy research made into a 'scheduled purpose' that would allow an HTF to operate legally and under regulation.

I am hoping that, as more people are made aware of the benefits of a Human Taphonomy Facility, the possibility of one being established in the UK becomes more feasible and realistic.

References

Alapo, L. 2016. Humans-Pigs-Rabbits Decomposition Study to Impact Court Cases Worldwide. [Online]. Tennessee Today. [Accessed 12th July 2017]. Available at: <http://tntoday.utk.edu/2016/04/27/humanspigsrabbits-decomposition-study-impact-court-cases-worldwide/>

Buffington, S.A.; Di Prisco, G.V.; Auchtung, T.A.; Ajami, N.J.; Petrosino, J.F; Costa-Mattioli, M. 2016. Microbial Reconstitution Reverses Maternal Diet-Induced Social and Synaptic Deficits in Offspring. *Cell*, 165(7): 1762-1775.

Enserink, M. 2017. Amsterdam to host Europe's first 'forensic cemetery'. [Online]. . [Accessed 12th July 2017]. Available at: <http://www.sciencemag.org/news/2017/01/amsterdam-host-europes-first-forensic-cemetery>

Green, A.; Fleeman, M. 2016. Casey Anthony Trial: 'Body Farm' Expert Testifies. [Online]. People. [Accessed 25th July 2017]. Available at: <http://people.com/crime/caylee-anthony-murder-expert-testifies-about-air-samples/>

Hrala, J. 2016. Human 'body farm' reveals we need to stop using pigs to establish time of death. [Online]. Science Alert. [Accessed 2nd July 2016]. Available at: <http://www.sciencealert.com/pigs-may-not-be-the-most-amazing-forensic-tool-after-all-finds-body-farm-researchers>

² The Human Tissue Authority is a non-departmental public body which governs and regulates the use of human tissue in the UK. See <https://www.hta.gov.uk/> for more information.

Stokes, K.; Forbes, S.; Tibbett, M. 2013. Human Vs Animal: Contrasting Decomposition Dynamics of Mammalian Analogues in Experimental Taphonomy. *Journal of Forensic Sciences*, 58: 583–591.

Svoboda, E. 2009. The Truth, Revealed by Bugs: The Case of Brookey Lee West. [Online]. New York Times. [Accessed 12th July 2017]. Available at: <http://www.nytimes.com/2009/05/12/science/12file-fly.html>

Thornton, L. 2017. Operation Ben Needham turned to Texas Body Farm for help with clues found on Kos. [Online]. The Mirror. [Accessed 25th July]. Available at: <http://www.mirror.co.uk/news/uk-news/operation-ben-needham-turned-texas-10858732>

Editors

Vanessa Campanacho

Telmo Pereira

Maria João Nunes

The published works are property of “Show Us Your Research!” and the authors.

The authors are solely responsible for the scientific content and the views expressed at Show Us Your Research!.