

Forensic Taphonomy in the UK – potential implications for cold case reviews

Introduction

There have been many developments within the field of Forensic Taphonomy, with contemporary literature recognising the importance of related scientific specialisms that can be applied within taphonomy, as well as the development of new ones (Hagland and Sorg, 1997). These latest advancements in our understanding of taphonomic processes may aid the progression of cold cases, where such information was not at the disposal of the original investigating organisation. For example, in some cold cases, it has been agreed that when attempting to estimate the time since death of remains, the accuracy of the judgment was affected by a variety of both intrinsic and extrinsic factors (Krogman, 2013). Current research conducted within the UK has its limitations when it comes to the accuracy of its application. Impediments, such as legal restrictions regarding the use of human remains, has resulted in the use of animal remains which deviates from authentic environments and affects the overall generalisability and validity of the research conducted within the UK. Therefore, this study focuses on UK based taphonomic research, drawing together information from a range of specialised scientific fields. The emphasis of this study is to identify the overall validity of taphonomic research in the UK and ascertain if the country can be justified in changing legislative boundaries surrounding the use of human remains, leading to the creation of facilities for taphonomic research with authentic environments.

Methodology

Due to the particular aims of the research, this study has taken a qualitative approach, allowing for an in depth understanding and analysis of the existing research on human decomposition in the UK and any reviews that need to be made to it while staying within ethical guidelines (Taylor *et al* 2015).

Furthermore, this research is interdisciplinary in nature, combining results from various areas of human decomposition, providing a comprehensive analytical outcome (Neuman, 2013).

Results and Discussion

Extrinsic Taphonomy (superterranean)

This study scrutinised the factors that contribute to the decomposition of remains on the surface, as it both contributes to and hinders the process of decomposition. Overall it found that the process of decomposing remains on the surface diverges greatly from a burial environment due to the restrictions of the release of gaseous diffusion and access by scavenger and insect activity caused by the soil (Janaway *et al* 2009).



Specifically, the presence and submergence of remains in water can not only alter the temperature level of the environment, but the bacterial and microbial communities within it which can affect rate of decomposition as well as the Post-Mortem Interval (PMI) estimation of the remains by forensic examiners (Mays, 2008).

Extrinsic Taphonomy (subterranean)

This study found that forensic investigators are able to gain an idea of the depth of burial as deeper buried remains will have microorganism activity consistent with an aerobic environment, increasing the rate of decomposition and adipocere formation (Polson *et al*, 1985). Furthermore, it was identified that soils with a varied pH support different fungal and microbial communities that affect the rate of decomposition in different ways, acting as an identifying factor in determining the soil environment in which the decomposition took place (Haslam and Tibbett, 2009).

The temperature of the burial environment can also have a significant impact on the rate of decomposition due to the fact that certain bacteria, crucial for the decomposition process, survive best at a temperature of 37 degrees (Polson *et al*, 1985).



Intrinsic Taphonomy

This study also examined the intrinsic taphonomy factors that can influence the rate of decomposition and affect the post mortem interval. The presence of open wounds and trauma has been shown to accelerate the rate of decomposition due to increased odour and access for scavenger activity, as well as increasing the flow of oxygen throughout the remains, thus aiding adipocere formation (Janaway *et al*, 2009). The ante-mortem age of remains will affect the rate of decomposition due to the lower body mass and height [of juvenile remains] resulting in a faster rate of decomposition (Gordon *et al*, 1988). The decomposition of juvenile remains is very underrepresented in research.



Effect on UK cold cases

This study reviewed the current legislative and academic restrictions to taphonomy research and how this affects the validity of conclusions drawn and consequently the efficacy of forensic investigations – including cold cases. As a result of the legislative restrictions of the use of human remains in studies taking place within the UK, substitute carcasses such as those of pigs and sheep are used as specimens (Adlam and Simmons, 2007).



It is widely acknowledged that the use of animal remains within research studies influences the level of validity and generalisability of the conclusions drawn within these studies. It is widely acknowledged that the study of human remains can deliver a superior degree of accuracy in demonstrating how certain intrinsic and extrinsic factors can affect decomposition rates.

Conclusion

It has been well documented that the way in which a body decomposes is influenced by both intrinsic and extrinsic taphonomic factors and so understanding their impact is crucial for accurate investigative techniques (Wescott, 2018). If there is not a viable way to replicate and accurately compare studies, especially if they are not using human remains or taking into account all the possible intrinsic and extrinsic factors, then the conclusions drawn will not provide quality results and they will not be fully applicable to forensic investigations or aid in the progression of cold cases (Matuszewski *et al*, 2019). Therefore, the presence of a taphonomic research facility within the UK and the alteration of legislation pertaining to the use of human remains would increase the validity of the research conducted within the UK as well as allow for a broader spectrum of both intrinsic and extrinsic factors to be studied without jeopardising the level of authenticity of the environment (Statheropoulos *et al* 2011). This would have a positive impact on the investigation of cold cases.