

# 1

## Introduction

**Nicholas Márquez-Grant<sup>1</sup> and Julie Roberts<sup>2</sup>**

<sup>1</sup>*Cellmark Forensic Services, Abingdon, UK; and Institute of Human Sciences, School of Anthropology and Museum Ethnography, University of Oxford, Oxford, UK*

<sup>2</sup>*Cellmark Forensic Services, Chorley, UK*

This volume stems from the editors' experience in archaeology and anthropology as applied to criminal investigation. Archaeologists have always been familiar with sampling for soils, pollen and other environmental sources to provide information about ancient landscapes and for their contribution to our understanding of the past. Likewise, physical anthropologists specialising in human skeletal anatomy have studied demographic profiles, disease patterns and funerary practices in past societies with the purpose of understanding the lifestyles and environment of pre-modern populations.

The disciplines of archaeology and anthropology (whether under the same umbrella or as separate fields of study), are closely interlinked with environmental sciences such as palynology, botany, pedology, geology and entomology. This applies in both modern and ancient contexts, although the way in which they are used will vary according to the questions being asked. For example, the physical anthropologist and palynologist working on an Iron Age settlement site might be utilising their skills to assess the life expectancy, health, diet and nutritional status of the people who once lived there, whereas at a crime scene the same expertise might be used to establish the identity of the deceased and to link a suspect to a scene. In both cases, the science and the principles behind it remain the same, although the specialists engaged in forensic casework need to have a good working knowledge of the criminal justice system of the country they are working in, and an awareness of their place within it.

The anthropologist or archaeologist dealing with human remains of forensic or medico-legal interest, should be familiar, prior to recovery of the remains, with a wide range of other forensic disciplines. This includes a general awareness of biomolecular and biological trace evidence and body fluids such as DNA, saliva, blood and semen, as well as other forensic evidence types including fibres, fingerprints and footwear marks. They should have a more detailed knowledge of pollen,

---

*Forensic Ecology Handbook: From Crime Scene to Court*, First Edition.

Edited by Nicholas Márquez-Grant and Julie Roberts.

© 2012 John Wiley & Sons, Ltd. Published 2012 by John Wiley & Sons, Ltd.

plants, diatoms and insects, which in our experience can often provide vital information relating to post-mortem interval (time-since-death), the manner in which the victim was disposed of, seasonality and even cause of death.

Whilst environmental evidence requires the attention of highly specialised scientists it is important that the anthropologist or archaeologist, who will often take the scientific lead on complex cases where remains are extensively decomposed, has a good appreciation of the potential applications of the related scientific techniques. It is also vital that they are trained and experienced in the collection of pollen, soil, insect and plant specimens in case the appropriate specialist is unable to attend the scene (although attendance by the appropriate specialist is always recommended as best practice).

Conversely it is important that police and crime scene investigators understand the role of the archaeologist, anthropologist and environmental scientist at the crime scene and how their specific areas of expertise can benefit a criminal investigation.

The disciplines of archaeology, anthropology, palynology, botany and entomology among others, can be used together to assist in the search, location, recovery and identification of human remains (and other buried evidence such as firearms or drugs). They can be utilised to indicate how much time has passed since the body was left at the scene and link suspects to scenes and victims, and they can be used to answer specific questions such as: Who is the victim? How long has the victim been dead? Is there a third party involved? How long has the victim been at a particular deposition or burial site? How did he or she die? And what happened after the death of the individual, for example did the suspect re-visit the scene, did animals damage the remains, or was the body moved? It should also be noted that the work of these specialists is not restricted to outdoor scenes and anthropologists and entomologists in particular may frequently be required to attend deaths in houses, garages or other indoor locations.

In this volume we encompass the environmental sciences within the term 'Forensic Ecology'. This is a broad description and its use can be extended to areas such as wildlife and environmental crime incorporating a wide range of applications. However, in this book we restrict ourselves largely to major crime, focusing on how anthropology, archaeology and ecology can aid in the investigation of missing persons, suspicious and unexplained deaths.

Many books have been published on the individual subjects of forensic anthropology, forensic archaeology, forensic entomology, forensic botany or forensic geology (e.g. Hunter and Cox, 2005; Blau and Ubelaker, 2009; Schmitt, Cunha and Pinheiro, 2006; Komar and Buikstra, 2008; Byrd and Castner, 2009; Gennard, 2007; Miller Coyle, 2005; Ruffell and McKinley, 2008). These volumes provide an introduction to each discipline, background information on the science, provide case studies and explain the methods involved, as do many of the thousands of scientific papers that have been published throughout the years. There are also volumes that include these areas of expertise in general introductory texts to forensic science or criminalistics (e.g. Saferstein, 2011; White, 2004; Anadón and Robledo, 2010; Gunn, 2006; James and Nordby, 2005). This book, however, focuses on drawing

together disciplines specifically related to environmental sciences, victim recovery and identification. It is aimed at forensic science practitioners and police officers currently involved in crime scene investigation as well as those still studying or working as trainees. It will provide them with an awareness of the potential applications of these disciplines and hopefully give them the confidence to decide when to call out the appropriate specialist and how to best preserve the evidence at the scene until they get there. The practical information relating to collection of ecological samples will ensure that police officers and crime scene investigators are in the best position to ensure that good practice is being utilised by the specialist they have invited to the scene. They may also have to follow the guidelines themselves in emergency situations where, for example, there is a long delay before the scientist can attend, the scene is remote or cannot be secured for any length of time. Forensic ecology is a discipline rarely taught in standard police or crime scene investigator training and as such this book can fill a potentially wide knowledge gap.

In addition to focusing on environmental evidence types, victim recovery and identification, we have set out to clarify aspects of crime scene management and police procedures which relate directly to the specialist at the scene. The importance of continuity and integrity of evidence is reiterated in a number of chapters throughout the book as it is vital for the practitioner to understand that whilst their specialist knowledge, expertise and results might be first class, if they fail to follow proper procedure (for example failing to sign an exhibit label or seal an item at the scene) their evidence may be rendered inadmissible with potentially disastrous results for a case. This was illustrated in the recent re-trial of two men accused of the murder of Stephen Lawrence in South London in 1993 (Daily Mail, 2012). The case for the prosecution almost fell apart not because of flaws in the scientific analysis and findings, but because some of the evidence had been stored in exhibit bags that had not been sealed, thereby providing the defence with an ideal opportunity to allege that the forensic evidence was in fact contamination which had occurred after the event.

The contributors in this book are extremely experienced forensic practitioners with a wealth of knowledge. The volume is structured in a way that provides a useful guide to forensic scientists and practitioners about the evidence types involved in the recovery and identification of human remains from forensic contexts.

Each chapter provides background information on the discipline it is concerned with and is structured in a logical sequence progressing through preparation prior to attending a scene (What questions should the scientist ask when receiving a call from a police force? What equipment do they need to prepare before attending a scene?), the scene attendance itself (including protocols at the scene, sampling strategies, recording), scientific examination and analysis of the evidence in the laboratory, and finally the production of an expert witness statement and court testimony.

In Chapter 2, aspects of crime scene management written by Forensic Practitioners from the Metropolitan Police Service in London are discussed. This relates primarily to roles and procedures employed in England and Wales, but the key personnel involved in crime scene investigation and the principles adhered to at the

scene are standard in most developed countries. Chapter 3 deals with forensic archaeology. This volume perceives archaeology and anthropology to be separate, albeit inter-related, disciplines, although in some countries archaeology may be seen as a subdiscipline of anthropology. Chapter 4 describes the role of the anthropologist in victim identification and in the assessment of post-mortem interval. It also summarises how the anthropologist's knowledge of skeletal anatomy can assist the pathologist in determining cause of death by physical reconstruction of remains and trauma analysis. It is followed by chapters on the use of radiography (Chapter 5) and sampling for DNA (Chapter 6) in victim identification. Other techniques that might be of assistance in determining post-mortem interval or the identity of the deceased include radiocarbon dating and isotope analysis (Chapter 7). Entomology is covered in Chapter 8, primarily with the aim of inferring post-mortem interval, whilst Chapters 9 to 12 deal with other ecological evidence types: diatoms, palynology, botany and geology. Chapter 13 provides an in-depth discussion on Police Exhibits including clear guidelines on what constitutes an exhibit, how to produce, label, document and store them. It also provides vital information relating to avoidance of the pitfalls that can so easily beset the practitioner if the correct procedures are not followed. Finally, Forensic Photography is a fundamental part of crime scene investigation and forms the primary record for attendance at any scene or examination. Chapter 14 describes the standard techniques used in Forensic Photography and guidelines for best practice to ensure that any images taken are relevant, include all the required information (for example a means of orientation, scale and exhibit number depending on the subject matter), and are of an acceptable standard to be presented in court.

We hope this book will be of some value to practitioners, police staff, academics and students, who may be required to attend crime scenes where human remains and ecological evidence types are present. We anticipate that it will enable them to realise the potential applications surrounding the disciplines of anthropology, archaeology and environmental science and give them a broader awareness of how a wide range of related scientific techniques can assist in victim recovery, identification and criminal investigation.

This volume would not have been possible without the tireless effort of our contributors, who we greatly thank for their time and their expertise. They are all experienced practitioners who have written their chapters whilst working full-time in their chosen fields. We are grateful for the support given by colleagues at Cellmark Forensic Services, UK, as well as friends and relatives during the process of editing this book. We would also like to express our gratitude to the staff at Wiley-Blackwell, especially Rachael Ballard and Fiona Seymour.

## References

- Anadón Baselga, M.J. and Robledo Acinas, M.M. (eds) 2010. *Manual de Criminalística y Ciencias Forenses. Técnicas Forenses Aplicadas a la Investigación Criminal*. Editorial Tébar S.L., Madrid.

## REFERENCES

5

- Blau, S. and Ubelaker, D.H. (eds) 2009. *Handbook of Forensic Anthropology and Archaeology*. Left Coast Press, Walnut Creek, CA.
- Byrd, J.H. and Castner, J.L. 2009. *Forensic Entomology: The Utility of Arthropods in Legal Investigations*, 2nd edn. CRC Press, Boca Raton, FL.
- Daily Mail*: <http://www.dailymail.co.uk/news/article-2079782/Stephen-Lawrence-trial-Gary-Dobson-David-Norris-guilty-murder.html> (accessed 12 January 2012).
- Gennard, D.E. 2007. *Forensic Entomology: An Introduction*. John Wiley & Sons, Ltd, Chichester.
- Gunn, A. 2006. *Essential Forensic Biology*. John Wiley & Sons, Ltd, Chichester.
- Hunter, J. and Cox, M. 2005. *Forensic Archaeology: Advances in Theory and Practice*. Routledge, London.
- James, S.H. and Nordby, J.J. (eds) 2005. *Forensic Science: An Introduction to Scientific and Investigative Techniques*, 2nd edn. CRC Press/Taylor & Francis, Boca Raton, FL.
- Komar, D.A. and Buikstra, J.E. 2008. *Forensic Anthropology: Contemporary Theory and Practice*. Oxford University Press, New York.
- Miller Coyle, H. (ed.) 2005. *Forensic Botany: Principles and Applications to Criminal Casework*. CRC Press, Boca Raton, FL.
- Ruffell, A. and McKinley, J. 2008. *Geoforensics*. John Wiley & Sons, Ltd, Chichester.
- Saferstein, R. 2011. *Criminalistics: An Introduction to Forensic Science*, 10th edn. Pearson-Prentice Hall, Upper Saddle River, NJ.
- Schmitt, A., Cunha, E. and Pinheiro, J. (eds) 2006. *Forensic Anthropology and Medicine: Complementary Sciences from Recovery to Cause of Death*. Human Press Inc., Totowa, NJ.
- White, P.C. (ed.). 2004. *Crime Scene to Court: The Essentials of Forensic Science*, 2nd edn. The Royal Society of Chemistry, London.

