FORENSIC OSTEOLOGICAL ANALYSIS

A Book of Case Studies

SCOTT I. FAIRGRIEVE

FORENSIC OSTEOLOGICAL ANALYSIS

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To
my son Sean
who is a constant source of pride, surprise and wonder.

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Dr. Hugo Ludeña Restaure [note: he does not have a Ph.D. but is addressed as Dr. which is the Latin American custom] is an archaeologist by training, but as director of the Patrimony Division of the Institute of Culture, he developed the team to investigate the Pizarro identification. He personally researched the ethnohistorical sources and published a series of articles that helped convince authorities to place the remains identified in place of those that had occupied Pizarro's crypt for nearly a century. He is currently assisting at the Department of Anthropology at the National University of Federico Villareal in Lima (a department that will have a strong bio-

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PREFACE

Most books are born out of the perceived necessity by their authors. This book is no different from any other in that respect. As an instructor in forensic osteology it has been clear for the past several years that a new book of case studies was needed. Further, a book of case studies with background information on how osteological analysis is applied to human/faunal remains found in legal contexts would be particularly timely.

This book is primarily designed for students of forensic anthropology/osteology who have a background in human anatomy and/or osteology. Even with this assumption, I recognize the fact that other interested individuals lacking this background may very well want to read this book for its many case studies. As I tell my students, if you do come across a term that is unfamiliar, I would encourage the use of a medical dictionary.

Every few years it is important to put forward cases for the review of our colleagues and students. Although many journals, such as the *Journal of Forensic Sciences*, regularly publishes case reports, there are instances when a more detailed and full description of circumstances are warranted by the author. Further, beginning students initially require a more thorough treatment of the thinking behind the application of analytical techniques; an important aspect that may not be covered in the professional literature.

Based on the foregoing, the premise of this book is that each case has a unique quality and thus presents unique problems for the analyst to approach. It is important for the reader to understand the limits of forensic osteology by examining not only its successes but also its failures. This book presents this type of information "warts and all."

All of the contributions to this book (including my own) have been subjected to peer review. In each case two reviewers were assigned to each paper. This process greatly enhanced the value of each paper and made my job as editor much easier. To all of those individuals who acted as reviewers, I am truly grateful for your pariticipation in this project. It is also without question that this effort would not have been possible without the contributors who also shared my vision. I am indebted to each of them for their diligence and patience; and from a purely selfish point of view, I have benefited from my interaction with each and every one. I am also thankful for the

prompt, helpful, and courteous responses to all my questions by the publisher of this volume, Mr. Michael Payne Thomas. His encouragement made this project always a worthy endeavour. A final thank you to my laboratory manager, Ms. Tracy S. Oost (Hons.B.A., Hons.B.Sc.); her assitance in the lab, and with various other duties, sufficiently freed my time in order to work on this project.

S.I.F.

CONTENTS

FORENSIC OSTEOLOGICAL ANALYSIS

Chapter 1

FORENSIC OSTEOLOGICAL ANALYSIS: AN INTRODUCTION

Scott I. Fairgrieve

INTRODUCTION

In 1984, Ted Rathbun and Jane Buikstra edited a book devoted to the presentation of case studies in forensic anthropology. The premise of their book is that we can learn a great deal by reading the accounts of various types of cases in forensic anthropology. This premise is just as true today as it was then. To that end, instructors of undergraduate and graduate level forensic anthropology courses have made the Rathbun and Buikstra book of case studies part of a standard reading list. As an instructor of just such a course, I too assigned its many instructive cases to my students. However, the criticism that would invariably come back to me was that the book suffered from not being current. This criticism is clearly a recognition of the fact that issues and techniques in forensic anthropology have undergone some development since 1984.

In the intervening fourteen years since the publication of *Human Identification*, there have indeed been many developments in forensic anthropology. For example, consider that in 1984 the use of DNA profiling was in its infancy; the regular application of this new technology to forensic contexts did not come about until the end of that decade. As a result, forensic anthropologists must work more closely with forensic biologists, particularly in the area of DNA biochemistry, as we both are interested, in many instances, in the identification of human remains. Although previous case studies are clearly very instructive, it is important to examine more current case studies in light of these new methods.

Recently, there has been the publication of volumes concerning new research in the area of forensic anthropology (e.g., Haglund and Sorg, 1997; Reichs, 1998a). These excellent volumes present current research in forensic

anthropology and, in some instances, provide examples of the research as drawn from various cases. However, they do not necessarily take the reader through all aspects of an investigation and the thought process of approaching a particular case.

In my original solicitation for contributions to this volume, I requested that the interested authors provide me with a case from start to finish. This is important, as I wanted my students, and of course other readers, to benefit from seeing how a case was approached, often in a novel way. It is true that each case has its own unique circumstances that may have a direct bearing on how it is to be approached.

CHAPTER DESCRIPTIONS

Although the case studies in this book can easily stand on their own, I have arranged these chapters by their prevailing theme. In the case where chapters deal with related topics I have grouped these together accordingly.

The book starts off with a case study of my own that deals with one of the most common questions asked of forensic anthropologists: "Are these remains human?" This simple question can in some instances be quite challenging to answer. It is clear that all practicing forensic anthropologists should have training in faunal osteology. In talking with my colleagues, it is clear that the bulk of requests for analysis that come to them from police services or coroner/medical examiners are in fact of non-human in origin. Reichs (1998b) found that for 1995, Diplomates of the American Board of Forensic Anthropology had 17.86% of their non-forensic cases as being of non-human origin; the remaining cases consisted of prehistoric and historic human remains (75.15% and 6.98%, respectively). Although this number may appear to be small, it will likely be quite variable from region to region. This, however, does not preclude the fact that faunal remains may indeed be of forensic interest. More and more, my own laboratory is being requested by representatives from the Ministry of Natural Resources in Northeastern Ontario to examine faunal bone. Poaching is a serious problem in this region and may begin to form a large portion of our casework. Given that this trend to consult on faunal remains in a forensic setting is likely to increase, the label of "forensic anthropology" may no longer be accurate. I would suggest that "forensic osteology" is more appropriate. Thus, this volume is entitled, *Forensic Osteological Analysis: A Book of Case Studies.*

Once the remains have been determined to be of human origin, among the tasks at hand is to identify the remains. Sex determination of the remains is an important step in this process. The more traditional method of sex

determination utilizes the morphology, or form, of the bones. Walsh-Haney et al. review the various features that help to distinguish female from male skeletal remains. The two cases they present clearly illustrate that although associated objects from the scene may strongly support one conclusion, the remains should still be examined for a biologically based assessment. This conclusion is supported by Saunders and Yang's chapter which details the use of morphology and DNA analysis to determine the sex of the individual. Their cautionary tale makes the point that although there have been many advances in DNA analysis, a morphological analysis by a forensic anthropologist is *still necessary.* In order to justify replacing the forensic anthropologist with DNA analysis there would have to be proof that the DNA analysis would never yield a false negative or false positive result. Meiklejohn et al. also present a case of an isolated femur for identification. However, in this case the morphological profile included both biomechanical and DNA analyses. The DNA analysis was performed in order to ascertain the relationship of the femur to a presumed mother and sister. The results, although supporting that supposition, were not conclusive on all accounts. Therefore, the use of a morphological analysis was warranted.

Forensic anthropologists are, in the first instance, largely preoccupied with making a positive identification of remains. Many members of the general public are convinced that this is usually an easy process as one can generally use dental records. However, many fail to recognize that if you do not suspect a particular identity of the remains then the initial search for dental records may be problematic. At the very least, the search for such records must be narrowed. Additionally, dental records may not be available, either because they have been lost/destroyed or because the decedent never sought dental treatment.

Warren and Falsetti present a case in which physical evidence found in association with skeletal remains helped to corroborate the morphological assessment. Photographic superimposition also played an important role in the identification process. Their chapter is instructive because it reminds us not to ignore associated physical evidence even though we are primarily responsible for the morphological analysis. The context of the remains and corroborative information may be key in the identification process. In the case presented by Melbye et al., the context and associated evidence indicated that the decedent met her demise over forty years ago. This span of time would be at the limits of what would be considered as "recent forensic interest" to the police. A computer-generated facial reproduction was created from the skull in the hopes that it would help in the identification process. This theme is further reinforced in the chapter that follows by Benfer and Ludeña "recent forensic interest" to the police. A computer generated facial reproductition of historically significant remains, specifically those of Don

Francisco Pizarro, the Spanish conqueror of Peru. Their study of morphological evidence, historical accounts and even the use of facial reproduction were enough to convince authorities that the newly discovered remains are Pizarro's and should replace those traditionally represented as those of the conqueror.

The processing of remains in an historic context is not as uncommon as one may think. Although the above case with Pizarro was a matter for civil authorities, historical contexts can still have a legal context. The spreading of contemporary cremated remains on the Little Bighorn Battlefield is tightly regulated by U.S. federal regulations. Willey and Scott detail how they applied forensic anthropologicial techniques to resolve questions concerning which remains rightfully belong at this historic cemetery site.

Commercial cremations, as with any other business, can be subject to legal liabilities. Kennedy outlines the fascinating problem of who is actually contained within a cremation urn. This civil case revolved around a family that had reason to doubt that a cremation urn contained the remains (or rather, cremains) of their infant daughter. This case demonstrates yet another way that forensic anthropology can serve, not only in criminal cases, but also in the sphere of civil litigation.

Most forensic anthropologists will agree that there is nothing routine in providing expert testimony in a courtroom. Skinner provides a detailed account of a cremation case from the perspective of not only performing the analysis but also providing the expert testimony at trial. Skinner is quite frank regarding the difficulties within this case and supplies us with a unique account of his own testimony and the inherent strengths and weaknesses of his evidence.

As with cremation cases, the scattering of skeletal remains can present special problems for accurate recovery. Spence's chapter details the forensic archaeological recovery of remains from a rural homicide scene. The recovery process in this case played an important role in reaching the conclusion that the body had indeed been deliberately concealed. This chapter raises the important point that a forensic anthropologist should not work in total isolation. The team approach to the processing of scenes is essential for maximizing the information available from recovered evidence.

As part of the team approach, forensic pathologists play an integral role in the interpretation of any pathological indicators on recovered remains. Pollanen's original study and case report on the interpretation of trauma to the hyoid bone is an excellent example of why forensic anthropologists should be working in close collaboration with pathologists. In his chapter, Pollanen broaches the question of whether or not strangulation is a reasonable conclusion based on the bony evidence. He does this by not only setting the context of the trauma to the hyoid bone itself, but also through the