Recovery to Repatriation: using cases from the past to develop future techniques

BAHID SUMMER CONFERENCE 2019

FIRE SERVICE COLLEGE, MORETON-IN-MARSH

5TH–7TH JULY 2019

Contents

BAHID 2019 Team

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BAHID Officers: Leigh Evans (Hon. Secretary), Kerry-Ann Milic (Hon. Treasurer)

BAHID Conference Organising Committee: Leigh Evans, Kerry-Ann Milic, Carole Davenport (Membership Secretary), Kathryn Sloper, Steven Walden, Rose Drew, Benedict Rodbourne, Esther Poulus, Dave Ridgewell, Mike Conway and Roos Eisma (Web Editor).

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BAHID Welcome

Welcome to the BAHID 2019 Summer Conference at the Fire Service College in Moreton-in-Marsh. It has been 6 months since the last meeting in Manchester and we look forward to catching up with you all, both socially and professionally. The general theme of the meeting looking at the use of case studies to inform the development of future techniques and protocols in disaster situations is one that resonates strongly with all attending, from student through to practitioner. Therefore, we have developed a range of workshops to sit alongside the talks in helping all to further develop skills in a range of areas, or for the curious to find out what happens in other identification related fields.

Our speakers this weekend will show us where things are moving, as they update us on developments in the workings of DVI teams, burial detection through the use of canines, fire investigation, anthropology and archaeology. Presentations will be from established and senior figures in their respective fields, as much as from those just starting out and developing their own research interests. All are equally valued.

There are a number of attendees who are fairly new to the Association but we hope that you still make the most of the expertise and contacts which you will find around you. For the established members please make sure that no-one gets left out, and for the newer ones please do not be backwards in coming forwards. Career pathways can start with the casual conversations of such events, and so please enjoy the weekend and go away all the more enthused. Being now much and mainly involved in international work, the Council offers a particular warm welcome to our members and guests from further afield. Your interest in joining with us, and the extra effort necessary for you to get here are well noted and appreciated.

The BAHID Council

Timetable of Events

Friday 5th July

11:00 – 12:00	Additional Incident Ground Tour for those arriving early (limited to 16 persons)
12:30 – 13:00	**Registration in the Edinburgh Lounge**
13:00 – 17:00	**Workshops:**
	Burnt/Commingled Remains workshop and scene
	Crime Scene Scenario Workshop
	Fire Investigation Incident Ground Tour – Meet in Four Shires Foyer, tour group to leave on minibus
	FES/VR Dogs talk and demonstration
17:30 – late	Dinner in Connections followed by drinks (cash bar) in the London Bar

Saturday 6th July

07:00 – 08:30	**Breakfast in Connections**
09:30 – 10:00	**Registration and Coffee – Edinburgh Lounge**
10:00 – 10:10	Welcome to the Summer Conference by Leigh Evans, BAHID Secretary
10:10 – 10:15	Introduction to the Summer Conference by Dr John Clark, BAHID President
10:15 – 11:15	Keynote Speaker: Howard Way - UK-DVI - Overview of the National DVI unit, its capabilities and case studies from significant incidents.
11:15 – 11.45	**Tea/Coffee and posters – Edinburgh Lounge**
11.45 – 12:15	Andrew Woodward - The College of Policing and the Importance of National Standards
12:15 – 12:35	Emily Fisher* - Quantifying the Impact of Insect Access on the Rate and Pattern of Cadaver Decomposition
12:35 – 12:55	Laura Ansty* - Discussing the use of Software and the role of the Forensic Artist in Composite Production
13:00 – 14:00	**Buffet Lunch in Connections**
	Please take this time to view the Poster presentations in the Edinburgh Lounge
14:00 – 14:20	Calil Makhoul* - The Potential of Vibrational Spectroscopy on Human Burned Remains
14:20 – 14:40	Mary-Jane Harding* - Investigating Fatal Fires: Understanding Heat Induced Alteration to Human Remains
14:40 – 15:00	Esther Poulos - MOLA/Hollandia Archeologen - The Man from the Bonehole
15:00 – 15:20	Dr Jan Bikker – Stichting Platform for Transnational Forensic Assistance – The Forensic Missing Migrant Initiative
15:20 – 15:50	**Tea/Coffee and poster – Edinburgh Lounge**
15.50 – 16:20	Tomasz Dabrowski - Marine Institute Ireland - Ocean Modelling for Forensic Investigations and Search and Rescue Operations

16:20 – 16:50	Gaille MacKinnon - Alecto Forensics - The integration of forensic archaeology and anthropology in the recovery and examination of human remains from fatal fire scenes
16:50 – 17:00	Close of Day
19:00 – 20:00	**Wine and drinks reception in the Edinburgh lounge**
20:00 - late	BBQ and drinks in the Edinburgh Lounge

Sunday 7th July

07:00 – 08:30	**Breakfast in Connections**
09:30 – 09:50	**Tea/Coffee and Biscuits – Edinburgh Lounge**
09:50 – 10:00	Introductions to the days talks
10:00 – 10:30	Dr Carole Davenport - Recovery to Repatriation: The varying role of the forensic anthropologist in mass disaster incidents
10:30 – 11:00	Dr Julieta Garcia Donas - University of Kent - Bone histology and chemistry for forensic identification: what can a small rib fragment tell you?
11:00 – 11:30	**Tea/Coffee – Edinburgh Lounge**
11:30 – 12:00	Rebecca Reid - The Defense POW/MIA Accounting Agency (DPAA) - The identification of US Military personnel following the Battle of Tarawa
12:00 – 12:30	Dr Roisin O'Reilly - Queens University Belfast -Human Remains - Anthropological Evaluations and Historic Case Examples
13:00 – 13:30	Closing remarks for conference with Honorary President, Dr John Clarke, followed by presentation of the student prize winners and group photo
13:30 onwards	**Conference close followed by lunch in Connections**

* Student presentation entries

Workshops

The conference will start with a series of workshops on Friday afternoon. With the exception of Workshop 3, each workshop will run once, with limited numbers for the more practical sessions. Due to the constraints, it will not be possible to switch workshops on the day.

Workshop 1 - Burnt/Commingled Remains workshop and scene

Understand the processes that bone undergoes when subjected to fire, how much damage can be sustained before DNA testing is no longer possibly. How does burning change the morphology of the bone? What if there are multiple individuals present? The lab session will involve the analysis of a number of bones, before heading outside to take part in our outdoor scene where you will be able to put your newly found knowledge to the test.

Workshop hosts - Dr Julie Roberts (LJMU), Dr Mike Walbank (Cellmark Forensic Services) and Dr Carole Davenport (LJMU)

Workshop 2 - Crime Scene Scenario Workshop

Attend your briefing prior to entering the crime scene house and searching for the evidence needed to solve the case. Learn about the procedures that must be adhered to when working on the scene, including evidence recording and collection, chain of custody, the roles of those present on the scene and complex a scenario can become. This scene will comprise of multiple evidence types, with some outdoor area included.

Workshop host - Mr Adrian Box - CSM/SIO Royal Military Police (retired)

Workshop 3 - Fire Investigation and Incident Ground Tour (11am and 1 pm)

No other organisation in the world can match the facilities offered by the unique incident ground at Moreton-in-Marsh. The 300 acre venue enables the replication of building fires, Urban Search and Rescue scenarios, train derailments, motorway pile-ups and even ship rescues. The college also designs challenging and complex training scenarios that really test the skill and ingenuity of firefighters and emergency responders at all levels. This means that emergency services professionals can experience real live training situations and develop their skills and techniques all within a safe environment. They can even simulate multiple exercises to immerse them in highly realistic situations. What's more, they can increase the complexity over time so that emergency responders learn how to tackle long-term, highly challenging situations. This enables them to gain the resilience and endurance skills they need to be effective in whatever situation they face. Join the Fire Service College on a tour of the Incident Ground and discover how it is used to train firefighters and other emergency responders in simulations.

Workshop hosts - The Fire Service College

Workshop 4 - FES/VR Dogs - Talk and demonstration

Learn about the work Forensic Evidence Search and Victim Recovery dogs carry out. This session will cover decomposition, the science behind scent and how it is related to the dogs. Learn about the Metropolitan Police FESD programme, how they breed, train and work with the dogs operationally with case studies as examples prior to seeing Mia at work.

Workshop hosts - Lorna Irish (DTSL), Sean Turner (Police Dog Training Instructor - Metropolitan Police) and Simon Barnes (Handler - Metropolitan Police), FEATURING Mia.

Lorna Irish: Senior Scientist within the Canine and Biosystems team at Dstl (Defence Science and Technology Laboratories) since 2016. I work with a variety of different detection dog disciplines in a number of different organisations (police, military, borderforce, prison service) around the UK. Prior to this I completed a PhD entitled "Comparison of Volatile Organic Compounds Identified from Cadaver Decomposition and Olfactory Performance of Trained Victim Recovery Dogs" at the University of Huddersfield. Since completing my PhD, I continue to offer scientific support to practitioners within the field of Victim Recovery and Forensic Evidence Search. This includes input into Victim Recovery dog, Police Search Advisor, Disaster Victim Identification and Scene Evidence Recovery Manager courses on the processes of decomposition and the relationship with search dog capability.

Sean Turner: I've been a police officer since 1990 and have served at Peckham, Notting Hill, Brixton and West End Central police stations. I've also worked on the MPS Public order unit. I've been involved with Police dogs since 2002. I was an operational handler between 2002 and 2015 based in the South East area of London. I have worked two General Purpose German Shepherd police dogs, both of whom were dual trained to look for live suspects related to crime and Human Remains work. I have also worked a specialist search dog trained to find drugs, cash and firearms. In 2015 I began work as full time Police Dog Training Instructor at the Metropolitan Police Dog Training Est. I am a qualified National Police Chiefs Council Dog training Instructor for both General Purpose Police dogs and Specialist search dogs. I currently work a 5yr old Labrador that is trained for Forensic Evidence recovery and specialises in locating the bodies of drown victims.

Simon Barnes: Simon joined the MPS in 2000. He has served at Greenwich and Tower Hamlets Police stations before joining the MPS Dog Support Unit in 2011. He currently works a General Purpose police dog, Louis and a Forensic Evidence search dog, Mia. Simon is a trainer at his base and covers the South East area of London.

Mia: Mia was one of our first specialist search dogs to undertake training as Forensic Evidence search dog. She was breed at the MPS Dog Training Est. in 2015 and began her training in 2016. She has been operational since 2016. She covers the whole of London assisting in investigations of serious crime and missing people searching for Forensic evidence. She has worked on a number of high profile investigations and has had a very successful career to date.

Speaker Abstracts

Keynote: Howard Way

Overview of the National DVI unit, its capabilities and case studies from significant incidents.

Howard Way is a Police Staff Senior Manager (& former police officer), posted from the London Metropolitan Police, to the UK National Disaster Victim Identification Unit (UK DVI).

UK DVI is funded by the UK Home Office and Foreign & Commonwealth Office. UK DVI works with police, local authorities, Coroners and forensic providers to help ensure that the UK has the capability to respond to mass fatality incidents in the UK or overseas when required.

Howard has an operational background in homicide and serious crime investigation. He also has significant operational experience in relation to mass fatality incidents.

In 2015 Howard was honoured by Her Majesty Queen Elizabeth the Second, receiving an OBE for "Services to Disaster Victim Identification."

Howard contributes to mass fatality capability planning and training nationally and internationally. He is the current Chair of the London Mass Fatalities Working Group and a member of the INTERPOL Working Group on Disaster Victim Identification.

Howard will provide an overview of the work of the National DVI Unit and the support it can provide, plus national mass fatalities capabilities.

He will also present some short case studies, in relation to some of the significant incidents from recent years.

Howard Way, UK-DVI

Andy Woodward

The College of Policing and the Importance of National Standards

ABSTRACT: The College of Policing has a mandate to set standards in professional development, including codes of practice and regulations, to ensure consistency across the 43 forces in England and Wales. It also has a remit to set standards for the police service on training, development, skills and qualifications, and provide support to help the service implement these standards.

During his presentation, Andy will explore the role of the College of Policing and its setting of standards and codes of practice as the Professional body for Policing along with the development of training and skills within DVI. He will explore the importance of those standards and how the College maintains them across the United Kingdom.

KEY WORDS: Professional standards, training, development, DVI

BIOGRAPHY: Andy retired from the Police service in October 2018 after 30 years' service. Since 2011 he was on secondment to the NPIA and subsequently the College of Policing as the National Civil Contingencies and DVI Training Coordinator. Andy spent his time in force initially within the roads policing unit and the subsequently managing the Specialist Operations Unit. He has managed multiple scenes and has been deployed in a wide range of DVI and specialist search roles. Having returned to the College in December, his current role now involves him delivering specialist DVI training, ensuring national standards across a number of key area`s and acting as an adviser at different levels of command. Andy also lectures on the National Urban Search and Rescue advisors course and the National Interagency Liaison Officers course and has worked closely in developing joint working protocols with the National Fire Chiefs Council.

Esther Poulos

The Man from the Bonehole

ABSTRACT: In March 2011, a set of human remains was discovered in the dunes at Groote Keeten (The Netherlands). Archaeologists were called in and the chance find was the start of a period of research into a nearly forgotten war, aptly named 'The Forgotten War': a largely unsuccessful invasion of the Netherlands by England and Russia.

This research also brought to light some of the possibilities and limitations of both identification and repatriation of the remains of soldiers from this pre-1914 conflict. The attempt at identification and repatriation of 'The Man from the Bonehole': a case study from an archaeological perspective.

KEY WORDS: Archaeology, 'The Forgotten War', identification, repatriation

BIOGRAPHY: After gaining a BA in Archaeology at the University of Leiden (2008), Esther repeatedly studied at Bradford University. There she first gained an MSc with merit in Forensic Archaeology and Crime Scene Investigation (2009), and six years later an MSc with distinction in Human Osteology and Palaeopathology (2015). In the years in between she worked at the Dutch commercial archaeological company Hollandia Archeologen, sold socks for a living and delighted school children with her tales from the trenches. She is currently employed as a

project supervisor with Museum of London Archaeology, where she gets to experience the daily highs and lows of British commercial archaeology. She has also worked for the ICLVR and Kenyon International Emergency Services, and recently registered with CRICC. At the weekends she acts in Murder Mysteries.

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Dr Jan Bikker

The Forensic Missing Migrant Initiative

ABSTRACT: The Forensic Missing Migrant Initiative is a project of Stichting Platform for Transnational Forensic Assistance, a Dutch non-profit Foundation. The Foundation has been established in part to address the ongoing tragedy of the estimated 17000 migrants who have died along the Mediterranean migratory routes since 2014, with the majority still unidentified and buried in unmarked graves. One of the key objectives of the Initiative is to assist organisations involved the management of missing persons and unidentified bodies in the promotion of forensic best practices and dignified procedures related to recovery, investigation, identification and burial of the remains of those who have died along the Mediterranean migratory routes. Additionally, the Foundation provides expertise that can contribute to further develop regional and transnational forensic data exchange mechanisms to increase the identification rate of unidentified remains cases likely to correspond to migrants. Furthermore, the Initiative offers advisory support to missing migrant's families searching for their relatives. To achieve its objectives, the Initiative aims to establish collaborative efforts between authorities, non-governmental/Civil Society organizations and academic institutions to advance on advocacy, assistance to families, forensic research to aid the identification process and development of a missing migrant framework at national and European level.

BIOGRAPHY: Dr Bikker is the Chairman and Founder of the Platform for Transnational Forensic Assistance/Forensic Missing Migrant Initiative aiming to promote transnational operational coordination and development of policies, forensic best practices, procedures and protocols at national and European level with particular focus on the management of missing migrants and unidentified bodies believed to be related to migration. Dr Bikker has been working on the missing migrant thematic in Europe since 2015 and has extensive experience of the migration context in the Mediterranean. He previously worked as Regional and National ICRC Forensic Advisor on the humanitarian management of the dead policy in relation to the forensic identification of deceased migrants in Europe. He also worked on the FASTID-project with INTERPOL to establish a centralised database of missing persons and unidentified bodies as well as development of uniform international DVI standards and training programmes for police forces and forensic experts. He is a Council Member of the British Association for Human Identification (BAHID) and a Steering Committee Member of the British Association for Forensic Anthropology (BAFA)

Dr Tomasz Dabrowski[1], Kieran Lyons[1] and Rob Fuller[2]

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Ocean modelling for forensic investigations and search and rescue operations

ABSTRACT: Operational ocean modelling and monitoring systems frequently provide important downstream services, such as for safety at sea, pollution management, climate studies, indices for aquaculture and fisheries and other. However, the authors encountered an increase in model simulation requests for forensic investigations and search and rescue activities in recent years. This paper presents the application of the Irish Marine Institute's operational modelling system to several different investigations as requested by the police officers and to support search and rescue activities in Galway Bay, west Ireland. The Institute is a member of the multi-agency consortium, coordinated by An Garda Síochánna, that was brought together to improve safety and the efficiency of search and rescue activities in Galway Bay. The following case studies will be presented:

- ❖ A case study concerning the reconstruction of potential paths of a body part found in Dublin Bay in early 2011
- ❖ In another case a confirmation of a transport pathway of a human body from a known entry site was sought from the authors
- ❖ In the third case, the authors were requested to reconstruct a movement of a body in Galway Bay, and in particular to confirm the possibility of a displacement from the entering to the discovery site within given timeframe
- ❖ The Institute developed a web application called ADRIFT that provides user-friendly interface to a sophisticated operational system based on state-of-the-art scientific numerical modelling package, and which enables a non-technical user to launch simulations that predict trajectories of drifting objects. This software is used at Galway-based RNLI station in support of their search and rescue callouts. The software will be demonstrated and some further case studies involving the use of it will be presented

The methodology is based on the particle tracking modelling and the authors provide details of the adopted approach in each of the above case studies along with a brief description of the operational modelling system set-up. The results prove that in relatively straightforward cases, a simple lagrangian approach provides useful services and confirms the suspected scenarios. Apart from model simulations, the authors mainly receive requests for tidal

information, e.g. times of low/high water at a particular location and time period. Further supplementary data that is delivered also includes wave and wind conditions. On request from RNLI, the authors also developed a detailed tidal atlas for Galway Bay. This atlas is based on a numerical model and Galway RNLI boats are equipped with laminated copies of it.

KEY WORDS: Ocean modelling, search and rescue, forensic investigations

BIOGRAPHY: Tomasz holds PhD in marine modelling and has 18 years experience in ocean, coastal and inland waters modelling and has worked in the academia, industry and a government agency. He is experienced in the delivery of ocean modelling for operational purposes as well as in the development of downstream modelling products and services for variety of end users. Since 2010 Tomasz has been a member of the oceanographic team in the Irish Marine Institute with main responsibility for the delivery of ocean modelling services both nationally and to numerous EU projects and programmes. He is also a Chartered Engineer and a Certified Project Manager.

Gaille MacKinnon

The integration of forensic archaeology and anthropology in the recovery and examination of human remains from fatal fire scenes.

ABSTRACT: Using a number of casework examples, this presentation will discuss the importance of the integration of the disciplines of archaeology and anthropology at fatal fire scenes and explore how these disciplines are utilised from body recovery through to post mortem examination.

KEY WORDS: Anthropology, archaeology, fire scenes, recovery, identification

BIOGRAPHY: Gaille MacKinnon is a Lead Forensic Anthropologist and Archaeologist with Alecto Forensics and is a Level 1 Forensic Anthropologist of the Royal Anthropological Institute, a member of the Expert Panel for Forensic Archaeology of the Chartered Institute for Archaeologists, a registered expert on the National Crime Agency expert database, and a member of the Home Office DVI forensic anthropology response team.

She has extensive casework experience in the United Kingdom which has encompassed investigations of terrorist bombings; disaster victim identification; murder; suspicious deaths; missing persons; child disappearances; and clandestine grave search, location and excavation. In the international arena, her expertise has been utilised in investigations into war crimes, crimes against humanity and genocide, mass fatality and terrorist incidents, transportation accidents, and natural disasters.

Most recently, Gaille led the forensic anthropology team for the Grenfell Tower disaster victim identification process under the direction of HM Senior Coroner for Inner West London and the Metropolitan Police Service.

Dr Carole Davenport

Recovery to Repatriation: the varying role of the forensic anthropologist in mass disasters incidents

ABSTRACT: At some point in most anthropologists' careers, there will be a phone call for deployment to a mass disaster incident. When that phone call happens you may go through a range of emotions, from nervousness to anticipation, perhaps even excitement at being able to put your hard earned skills to use when you get there. You pack up your bone manual and callipers, wonder whether they will provide PPE and check that all your vaccinations are up to date. Then you are ready to go, nervous excitement keeps you awake during your travel there, but what faces you on arrival. A recent incident doesn't usually mean that you will be working with skeletal material.

This presentation will look at the potential tasks requested of an anthropologist during a deployment to a mass disaster scenario, using examples from a recent incident. It will conclude with recommendations of areas to develop training for potential future deployments.

KEY WORDS: DVI incidents, anthropology, deployment, training

BIOGRAPHY: Carole Davenport is a forensic anthropologist employed by Blake Emergency Services and a full time Maths and Statistics lecturer at for the Academic Achievement Team at Liverpool John Moores University. She has been a Royal Anthropological Institute certified FA-III anthropologist since 2015 and a member of the UK-DVI Forensic Anthropology cadre since February 2019. Her research areas include clandestine burial detection and the influence of taphonomic conditions on the decomposition of human remains. She was awarded her doctorate in 2018 in biological and physical anthropology and holds a first class honours degree in forensic anthropology. She is the Membership Secretary for the British Association for Human Identification and a Fellow of the Royal Anthropological Institute and Member of the British Association for Forensic Anthropology.

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Dr Julieta Garcia-Donas[1,2], Robert R. Paine[2], Elissavet Dotsika[3], George Diamantopoulos[3]; Ffrossyni Michopoulou, Elena F. Kranioti[2,4]

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Bone histology and chemistry for forensic identification: what can a small rib fragment tell you?

ABSTRACT:
Introduction: Age-at-death and origin are crucial pieces of information required for the identification of unknown individuals. Macroscopic, microscopic and laboratory-based analyses are used for these purposes with the choice of the method being critical to ensure accurate results. This research investigates the development of Cretan population-specific methods of identification through bone histology and isotope analysis.
Materials and Methods: Fifty-two rib fragments of known age from the Cretan osteological collection were used for this study. Histomorphometric analysis and multi-isotope profiles were

applied in an effort to explore age related changes and their significance in origin prediction. Moreover, histological and stable isotopes- data were analysed jointly in a small sample set (N=11). Statistical analysis was performed with IBM SPSS 24.

Results: Age estimates showed higher accuracy rates using population-specific formulae with a minimum error of 13 years from known age when applying two histological variables. C13 and N15 showed correlations with age and differences were also observed between healthy and pathological samples. The combination of both data analyses on the small data set provided age estimates with less than 10 years of standard error.

Conclusions: Rib fragments are routinely used in forensic age estimation and stable isotopes in diet reconstruction and determination of origin. This paper gives a different perspective in forensic investigation by investigating separately and jointly both analyses conducted in small rib samples. Confirmation of this preliminary analysis is required and it can open new avenues in forensic identification applicable in a range of fatalities involving unidentified individuals.

KEY WORDS: rib, histomorphometry, age estimation, stable isotopes

BIOGRAPHY: Dr Julieta G. Garcia-Donas is a forensic anthropologist with an interest in bone histological analysis for forensic identification purposes and the development of biometric standards for Mediterranean populations. She completed her studies at the University of Edinburgh where she received a MSc in Forensic Anthropology and was awarded with a PhD based on forensic age estimation using rib histomorphometry. Julieta has been involved with different international institutions (Forensic Institute of Tirana - Ministry of Justice of Albania, and Pathology Division -Heraklion, Greece) and carried out field work/research in Spain, Greece and Cyprus. Julieta is currently working as a lecturer in Biological and Forensic Anthropology at the University of Kent.

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Rebecca Reid and Dr Rebecca Taylor

The Identification of U.S Military Personnel following the Battle of Tarawa

ABSTRACT: The Defense POW/MIA Accounting Agency (DPAA) is a United States Department of Defense agency whose mission is to search for, recover, and identify U.S. personnel missing from past military conflicts. As part of these efforts, the DPAA established a commingled human remains (CHR) project dedicated to casualty resolution of Battle of Tarawa losses. The Battle of Tarawa occurred over three days during World War II, and resulted in over 6000 U.S., Japanese, and Korean casualties on a three-square mile Pacific Island. The initial need to quickly bury the deceased and post-war consolidation efforts led to the commingling, the disassociation of remains and the loss of original burial information, resulting in a difficulty of identifying casualties. The development of modern forensic processes, such as Next Generation Sequencing DNA testing and chest radiograph comparison, have allowed for the identification of previously unknown U.S. individuals from the battle. Since the advent of the CHR Project in 2016, to the 75th anniversary of the Battle of Tarawa in November 2018, the DPAA has been able to account for 83 of the more than 400 missing U.S. military personnel. This presentation will provide an overview of the resolution of commingled human remains within the Tarawa CHR Project and how previously unaccounted-for U.S. military personnel are being identified today.

BIOGRAPHY: Rebecca Reid is a SNA International Forensic Anthropologist for the Defense POW/MIA Accounting Agency (DPAA) in Hawaii. She is a member of the Commingled Human Remains (CHR) Project dedicated to the resolution and identification of commingled U.S. military remains following the Battle of Tarawa during World War II. Rebecca has a research interest in the application of bone histology in forensic anthropology, and also conducts histology casework at the DPAA. She received her BSc (Hons) in Forensic Anthropology at the University of Dundee and her MSc at the University of Lincoln. She is also a Fellow of the Royal Anthropological Institute and member of the British Association of Forensic Anthropology.

Roisin O Reilly

ABSTRACT: A presentation of various forensic anthropology and historic osteological cases from 2016-present in Northern Ireland. Including a multiple disciplinary approach, site visits, the search for human remains and trial and error from cases - 'Viking' Burial, Operation Skipper, The Forgotten Nun, Washed Up, Forgotten Discoveries, Middletown Confession and Mr Concannon.

BIOGRAPHY: I am an independent consultant forensic anthropologist and human remains specialist in Northern Ireland. I am trained in forensic field archaeology, including the search, recovery and identification of human remains, and forensic anthropology, including skeletal development, anatomy, pathology and trauma at Bournemouth University. I am also trained in Forensic Simulations in Mass Graves and Temporary Mortuary management. I hold a Doctorate (PhD) in Human Osteoarchaeology and have training in clinical anatomy and body recovery procedures.

I am a Fellow of the Royal Anthropological Institute and a Member of British Association for Human Identification. I am an Accredited Forensic Anthropologist Level III under the UK Justice System. I several years of experience in the examination and analysis of human remains in historical and forensic contexts. To date I have worked with various forensic pathologists in examining decomposed and skeletonised individuals and identifying bone from non-bone and human from non-human remains. I have also assisted the Police Service of Northern Ireland (PSNI) in the search and excavation for missing individuals. Internationally, I have assisted the Dutch Police in the management and repatriation of property recovered from the Malaysia Airline Incident Flight 17 in 2014. I conduct ongoing multidisciplinary research in forensic anthropology and human osteoarchaeology.

Student Oral Presentation Abstracts

Emily Fisher* - University of Derby

Quantifying the impact of insect access on the rate and pattern of cadaver decomposition

ABSTRACT: While the sequence and stages of decomposition are known to relate to a range of taphonomic drivers, such as temperature, body size and insects (Mann et al, 2015), there has been little investigation into the independent effect of these drivers. This poster will report finding of a study looking at the determination of rate and pattern of decomposition of pig carcasses when a major taphonomic driver, insect access, is removed or restricted. Three experimental pig carcasses were placed under cages designed to prevent access to entomological fauna and scavengers to the carcasses, and three control pig carcasses were placed under scavenger proof cages. The rate (accumulative degree days), and pattern (total body score) of decomposition were recorded every 48 hours over nine weeks, allowing sufficient time for the carcasses to reach skeletonization. Temperature and rain fall were also recorded over this period. ANOVA tests have been used to identify any differences in rate (ADD) and pattern (TBS) of decomposition from the results of both the experimental and control carcasses. It was predicted that the rate of decomposition would be slower in the experimental condition due to the limited insect access. Insect access is affected by many variables, one being indoor habitats which are tightly sealed or secured buildings with cooler temperatures, such as basements (Matuszewski, and Mądra-Bielewicz, 2019). The findings of the study will have implications for future forensic taphonomy and accurate calculations of post-mortem interval.

References:

Matuszewski, S., and Mądra-Bielewicz, A (2019) 'Post-mortem interval estimation based on insect evidence in a quasi-indoor habitat' Science & Justice, 59, pp. 109-115.

Mann, R. W., Bass, W. M. and Meadows, L. (2015) 'Time Since Death and Decomposition of the Human Body: Variables and Observations in Case and Experimental Field Studies', Journal of Forensic Sciences, 35(1), p. 128.

KEY WORDS: Forensic taphonomy, decomposition, forensic entomology, accumulated degree days, post-mortem interval (PMI)

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Laura Ansty* - University of Dundee

The Growing Importance of Digital Forensic Art in Facial Identification

ABSTRACT: With the growing number of cameras available for personal use, people are taking more photographs than ever, and these photographs can become useful tools to find and identify people.

By using software, such as Adobe Photoshop, forensic artists can reconstruct the faces of the unidentified dead as well as artificially age missing people. Because Photoshop works in layers the actual image of the person can be the base of the reconstruction. This is useful as it keeps the resemblance intact throughout the artistic process.

Age Progression:

The use of Adobe Photoshop enables the artist to:
- Morph, liquify, move and edit the face more easily
- Update external attributes such as updated hairstyles and clothing
- Overlay the features of immediate family to preserve family resemblance to more accurately age the subject
- Complete an artificially aged appearance of the missing person to be released to the public for identification purposes

Post-Mortem Depiction:

- Eliminate any lens distortion
- Remove distracting/inappropriate elements. This may include discoloration, bloating or cuts
- Restore colour to the skin
- Make the subject appear 'alive', by opening the eyes or closing the mouth
- The artist may wish to add supplementary images (e.g. clothes, hair, or restore features that may not usable)
- Enable an appropriate image of the decedent to be released to the public

The use of Adobe Photoshop can be used to:

- Eliminate any lens distortion
- Remove distracting/inappropriate elements. This may include discoloration, bloating or cuts
- Restore colour to the skin
- Make the subject appear 'alive', by opening the eyes or closing the mouth
- The artist may wish to add supplementary images (e.g. clothes, hair, or restore features that may not usable)
- Enable an appropriate image of the decedent to be released to the public

Therefore, if the artist has a background in taphonomy and facial anatomy, photographic manipulation software can be relatively accurate and cost-effective means of enabling identification.

KEY WORDS: Adobe Photoshop, post-mortem, age progression, facial identification, forensic art

BIOGRAPHY: I am currently studying at the University of Dundee for my master's degree in Forensic Art and Facial Identification. I have a facial recognition success rate of over 90% and I have been part of multiple online research studies for the University of Greenwich for Super-Recognition.

My focus is currently in Forensic Art; with particular interests in composites, artificial age progression and post-mortem depiction. I have over 8 years' experience in Adobe Photoshop and an underlying understanding of full body & facial anatomy and taphonomy.

As part of my Master's course I have produced work in various shapes and forms, from facial reconstruction FreeForm haptic sculpture, clay and wax sculpture to graphite and charcoal drawing to digital sketching.

Before moving to Dundee, I studied at the University of the West of England and I achieved a First-Class Bachelor's Degree in Drawing and Print. I specialised in portrait drawing and I have been actively producing portraits for the last 5 years in a variety of media. I have previously exhibited my portrait artworks at the 2016 'Drawn' Exhibition at the RWA in Bristol, and in the 'Portrait Prize' at the RBSA Gallery in Birmingham.

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Calil Makhoul[1,3]*, Luís Batista de Carvalho[3], David Gonçalves[1,2,4] and Eugénia Cunha[1,2].

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The Potential of Vibrational Spectroscopy on Human Burned Remains

ABSTRACT:
Objectives: Burned human remains pose challenging analytical problems to forensic anthropologists due to heat-induced changes. The determination of the maximum temperature of exposure is also another question which is complex to solve. This research explores the potential of vibrational spectroscopy in determining the maximum temperature based on spectra from the organic composition of burned human skeletons and the possibility to individualize the human burned remains.
Methodology: 280 samples from twenty skeletons of the 21st Century Identified Skeletal Collection (University of Coimbra) experimentally burned at different maximum temperatures (from 500 oC to 1050 oC) and durations (45 to 240 minutes) were analyzed through vibrational spectroscopy, namely FTIR and MicroRaman.
The relationship between the spectra of individual bones (long bones, and hip bone) and the variation of the intensity of the bands assigned to either organic or inorganic components such as amide I and II vibrational modes of proteins, CH_2 bending and stretching vibrational modes of lipids, carbonate, hydroxyapatite and phosphate were investigated.
Preliminary results: The correlation of the spectra of the organic and inorganic components with the temperature of exposure is clear. However, the duration of the burning is still a variable which needs to be further investigated since high temperature for a short time or low temperature in a long duration may possibly cause similar results.
Conclusion: This study obtained promising results regarding the potential of analyzing vibrational spectra from burned human remains to assess the maximum temperature at which they have been exposed to, and to individualize it.

KEY WORDS: Forensic anthropology, human burned remains, chemical anthropology, recovery

BIOGRAPHY: Calil Makhoul is a forensic entomologist and current PhD student in Forensic Anthropology. His doctoral work explores the individualization of burned human remains, particularly, in scattered and commingled contexts. He is a C-FASE certified Level II. Calil gives lectures in Human rights and Forensic Anthropology.

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Mary Jane Harding* - Cranfield University

Investigating Fatal Fires: Understanding Heat induced alteration to Human Remains

ABSTRACT: Burnt human remains can be discovered in various contexts, from archaeological and cremated remains to modern day fatal fires of both accidental and intentional nature. Whilst people may be aware of the final resulting 'pugilistic' pose of a fatal fire victim, the transition of the body through heat induced alteration to this point, is a narrative that is not common knowledge and is the primary focus of my PhD

Analysing, understanding, and interpreting the position, and level of damage sustained by the body is an integral part of investigating a fatal fire. As fire investigators assess the surrounding environment seeking to understand the fire's cause and origin, with every fatal fire investigated, treated as a crime until proven otherwise.

The body can reveal key indicators as to the fires development, and conversely, bodies can move through heat induced alteration, which has potential to lead to misinterpretation. In well-developed fires, peripheral elements of the body can be subject to disarticulation, with the recovery of these biological elements further complicated, by structural debris surrounding the fatality. raise an awareness of the variation of body movement, and highlight the importance of accurate and precise recording of the remains in situ.

This research addresses the gap in knowledge by increasing our understanding of heat induced movement; the result of which aids attentiveness to recording detail at fatal fire scenes, thus augmenting subsequent retrieval of disassociated bones and artefacts.

KEY WORDS: Fatal fire, human remains, recovery

BIOGRAPHY: I am currently researching my PhD, titled 'Fatal Fires: Understanding heat and flame alteration to the Human Body'. As part of my PhD, I undertake research, and also instruct, on the Forensic Fire Death Course in California, USA.

With a BA (Hons) in Archaeology I have been involved in the recovery of human remains in the archaeological context for the past 13 years, from medieval graveyards to an Anglo Saxon cemetery. I also hold an MSc in Forensic Archaeology, and whilst being taught in many forensic techniques, I decided to major in Fire Investigation. My Thesis 'Analysing the differentials between fleshed and defleshed remains in open combustion', was awarded the Cranfield Distinction Prize.

In 2014 I undertook Fire Investigation training, and have been fortunate enough to have been an Academic Attachment with Dorset and Wiltshire Fire Service, Fire Investigation team since. As part of this collaborative measure, I have also attended Fire Behaviour Training, and feel that this has provided me with a very 'Pracademic' (Practical and Academic) approach to my research.

 In 2017 I was employed as a Lead Archaeologist/Scientist at Grenfell Tower, tasked with the search and recovery of victims of the tragedy. I spent 6 months working with the MET Police DVI (Disaster Victim Identification) team, supervising excavation and recoveries from within the tower.

*Presentations are student prize eligible.

Poster Presentation Abstracts

Julieta G. García-Donas[1,2], Effrosyni Michopoulou, Andrea Bonicelli[2], Konstantina Tsiminikaki[2], Bledar Xhemali[3], Mara Karell[2] and Elena F. Kranioti[2,4]

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The use of Bayes Factor for model selection for predicting age: an example on clavicular histomorphometry

ABSTRACT:

Introduction: Histomorphometry has been extensively applied for estimating age-at-death. Although ribs have been commonly used for histological age, other bones need to be considered in order to contemplate possible bone specific remodelling rates and various recovery scenarios.

Materials and Methods: Thirty-two left clavicle midshaft fragments were obtained from routine autopsies conducted at the Institute of Forensic Medicine (Albania, 2014-2015). Thin-sections of 0.5-1mm were prepared using standard protocols. Thirteen histomorphometric variables were collected using a Reflected Light Microscope and data were analysed using JASP 9.0.1.

Results: Bayes factor showed that the existence of positive correlation of OPD with age is 348,050 times more likely than the lack of correlation. In addition, Mean Perimeter and Mean area are 1.047 and 1.357 times more likely to have a positive correlation with age that the alternative variables. Bayes linear regression was used to compare different predicting models. The best model includes OPD and Osteon Perimeter (R^2=0.678, SEE=7.5years) which is 2.388,000 times more likely to explain age than the null model.

Discussion: The Bayesian approach allowed the evaluation of the fitness of the model compared to the null model and to better explain the causative relationship of the predictors with age. This study is only the fourth worldwide performed on clavicular histomorphometry and provides unique population specific standards for age estimation of future forensic cases in Albania. The use of RLM as a new technique on forensic bone histology can be further tested and applied on a variety of skeletal elements.

KEYWORDS: Clavicle, age estimation, forensic cases, histomorphometry, Bayesian models
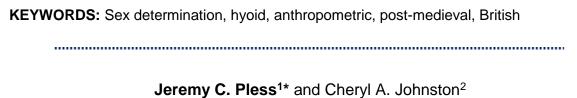
Amrit Minhas* – Kingston University London

Metric Approaches to Sex Estimation Using the Hyoid: Assessing the Applicability of Current Methods to a Post-Medieval London Population

ABSTRACT: Several studies using different populations demonstrate that the hyoid bone is sexually dimorphic and measurements of the hyoid could be used successfully in the estimation of sex for human remains. Komenda and Černý (1990), and Kindschuh et al. (2010) created discriminant functions for a range of measurements of the hyoid, tested by Urbanová et al. (2013). These studies attained accuracy rates ranging between 82% and 96% for their sample populations.

To assess the applicability of these approaches, 104 adult hyoids from individuals of known sex were selected from post-medieval London cemeteries from the Museum of London and from St. Bride's Church, Fleet Street. A total of 12 measurements from the hyoid were taken from each specimen for further statistical and discriminant function analysis.

This study found a number of these measurements to be reliably sexually dimorphic, including total length, greater horn length, and body length. Accuracy for the post-medieval London population diverged significantly from the original populations for which these methods were developed. In this study, correct sex estimation ranged from 40% to 62%. The best-performing functions required the entire hyoid to be present.

The mean values for each measurement were consistently smaller than in the original Czech populations used to develop these functions. This suggests population-specific functions should be developed to achieve better accuracy in sex estimation. Furthermore, the low presence of hyoid bones in skeletal assemblages with otherwise good recovery rates, the number of partial and fragmentary hyoids suggest methods using the hyoid may not widely applicable to archaeological remains.

KEYWORDS: Sex determination, hyoid, anthropometric, post-medieval, British

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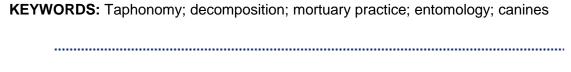
Impact of human biomass reduction through composting on postmortem interval estimate reliability

ABSTRACT: As ecologically sustainable mortuary practices have become increasingly popular, forensic anthropologists may soon be presented with a new set of questions regarding the processes related to the postmortem alteration and disposal of human remains. One such practice, the conversion of human remains to soil via composting, is currently under development by a group in Seattle, Washington, USA called Recompose. The goal of Recompose is to provide an option in death care which does not require that land be set aside as happens with conventional burial practices, or that potential pollutants be released into the environment as happens with cremation or in the burial of embalmed remains.

The FOReSt (Forensic Osteology Research Station) at Western Carolina University (North Carolina, USA) began the preliminary phase of the Recompose project, focused on understanding the viability of composting to reduce biomass of human remains. In this, several observations were made that are relevant to forensic anthropology: soft tissues decomposed quickly and without noticeable production of odors typical of decomposition; nationally accredited Human Remains Detection K9s, trained on whole body decomposition, did not offer their trained final response when exposed to the interred remains; and little to no insect activity was observed.

These early tests demonstrate potential complications for forensic anthropologists, as this process results in the overestimation of post mortem interval and removes many of the external tell-tale signs commonly associated with decomposition. The introduction of this novel funerary option, which, if evolves into mainstream practice, will demand new taphonomic research and investigative understanding.

KEYWORDS: Taphonomy; decomposition; mortuary practice; entomology; canines

Rhian Skinner* – Kingston University London

A Comparison of Fordisc and Cranid in the Estimation of Sex and Population Ancestry for a Post-Medieval London Population

ABSTRACT: Craniometric analysis is a potentially useful non-destructive approach to the estimation of population ancestry and sex. In this study, two widely used craniometric programs, Fordisc and Cranid, were compared. A sample of 40 adult skulls of known-sex from the St Brides skeletal collection were analysed. The available biographical and archival records provide strong support for all these individuals being of a European-derived Caucasian population ancestry. Fordisc and Cranid utilize cranio-facial dimensions and apply a range of statistical analyses, such as linear discriminant and nearest neighbour analysis, to compare the study sample to data sets comprised of both contemporary and historic crania.

This study assesses the overall accuracy rates attained in estimating both sex and population ancestry. It assessed the applicability of these approaches to a post-medieval British sample, and identified which reference populations in the two programs were most similar. Cranid performed better than Fordisc in both sex and ancestry estimation. There was no significant difference in results using Fordisc's historic Howells database or contemporary FDB database. The impact of entering known sex data in Fordisc on the accuracy of ancestry estimation was also assessed. A detailed assessment of inter- and intra-observer error was undertaken, suggesting some measurements were prone to systematic error, or lacked clear anatomical landmarks. A number of skulls had facial width or cranial vault measurements outside the accepted range. Possibly some cranial bones were subject to taphonomic pressures in these crypt burials that were not noted through visual observation. Future research will explore this possibility further.

KEYWORDS: Craniometric Analysis, Cranid, Fordisc, ancestry estimation.

Lydia White* – Kingston University London

Metric Sex Estimation Methods using the Mandible on a Post-Medieval London Population: Evaluating Accuracy for Fragmentary Remains and Assessing the Impact of Tooth Loss on Dimorphism

ABSTRACT: An extensive number of studies have demonstrated the mandible can be used successfully in sex estimation for human skeletal remains, using metric and anthroposcopic approaches. This study assessed metric methods utilising discriminant function analysis of different portions of the mandible, as developed by Franklin et al. (2008) and Saini et al. (2010). This enabled an assessment of which metric approaches to partial or fragmentary mandibles could be used with confidence. A subset of edentulous mandibles was also tested to assess whether ante mortem tooth loss impacted on measurements of the mandible, and if so, which portions were most impacted. A total of 117 adult individuals, 63 males and 54 females of known sex from the Museum of London and St Brides skeletal collections were assessed. The different functions produced accuracy rates ranging from 50 to 90%, with the majority attaining success rates of 70% or more, suggesting fragmentary mandibles can be metrically sexed with reasonable confidence. Franklin's functions using the symphysis and unilateral measurements performed well. Ante mortem tooth loss had no significant impact on the use of these metric approaches and comparable accuracy was attained for the edentulous sample. Despite being developed for different populations, some of these discriminant functions were applicable to a post-medieval London population. Future research will be to develop population-specific functions and assess visual sex estimation methods on the edentulous sample.

KEYWORDS: Mandible, edentulous, anthropology, sex estimation, Post-Medieval

*Presentations are student prize eligible.

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