

# BAHID

BRITISH ASSOCIATION FOR  
HUMAN IDENTIFICATION



## 'From Innovation to Identification'

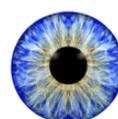
BAHID 2016 Summer Conference

10<sup>th</sup> – 11<sup>th</sup> June 2016

*West Park*  
*The Perfect Venue*



**SRi FORENSICS**



Centre for Anatomy &  
Human Identification

## **Your BAHID 2016 Team**

**BAHID Honorary President:** Dr Dick Shepherd

**BAHID Officers:** Tom Black (Hon. Secretary), Ray Evans (Hon. Treasurer)

**Organising Committee:** Dr Lucina Hackman, Tom Black, Ray Evans, Dr Leigh Evans, Kerry-Ann Milic, Dr René Gapert, Cal Davenport (Mem. Secretary)

**Student volunteers (Friday):** Brooke Jordan, Robyn Cunningham-Dunlop, Ellenor Millican, Nitin Aggrawal

**Student volunteers (Saturday):** Djuna Elkan, Robyn Powell, Jessica Baker, Francesca Dunn, Claire Fitton, Amelie Poilliot

**Web and technical support:** Dr Roos Eisma

## Welcome

It is summer once more, and time to venture north again to the vibrant city of Dundee for a welcome to the BAHID summer meeting, entitled '*From Innovation to Identification*'. On this occasion, we have been invited to hold a joint meeting with the University of Dundee, specifically their Centre for Anatomy & Human Identification.

Additionally, I invite all delegates and members to welcome Dr Dick Shepherd, who has favoured us by consenting to be the BAHID Honorary President for the next two years. As well as being a man of considerable professional talents, reputation and international experience as a Home Office-registered forensic pathologist, Dick Shepherd is among the most affable, knowledgeable and helpful gentlemen you could ever hope to meet, and he will be here for the duration of our conference, as well as making an inaugural presentation.

Our meeting comes at a time of significant new development for the University of Dundee and all forensic science in the UK with the launch here of the new Leverhulme Research Centre for Forensic Science on the 1<sup>st</sup> of July this year. With express support and input from the very highest levels of the British judiciary and the Royal Societies of London and Edinburgh, Professor Sue Black and her team seek to raise the bar in finding new and better ways for a range of sciences to underpin the innovation necessary and, as Leverhulme Trust themselves put it, "*disrupt the current inertia within the forensic science ecosystem*". Indeed, the creation of this new center no doubt heralds the biggest shake-up in living memory of the ways in which forensic science supports and interfaces with the criminal justice system, and we will be treated to a fascinating exposition on these radical developments by Professor Black during our main conference day.

As always, BAHID meetings are mostly about the people and the range of knowledge and experience they bring; the networking, the sharing of ideas and often the recognition of new opportunities for co-operation between delegates and institutions. To that end, I encourage all of you to mix openly and come to our casual social gathering on the Friday night as well as the Saturday dinner to enjoy the company of new friends and old!

**Tom Black**  
**BAHID Honorary Secretary**

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## Timetable of Events

### Friday 10th June

#### **14.00 - 17.00 Creative writing workshop with Stuart McBride, Prof Sue Black and Eddie Small.**

Are you interested in crime related creative writing and never know who to ask to ensure that you get all of the forensic details correct? BAHID are running a half day workshop which is perfect for you. Run by experienced writers with forensic specialists standing by to answer your questions. The famous crime writer Stuart McBride will also be around to answer your questions. Bring your ideas with you, ask the forensic experts and learn from the best.

#### **14.00 - 17.00 Identification without Borders Sandpit Event – Prof Nic Daeid and Dr Hackman**

BAHID is hosting a half day sandpit event bringing together academics, researchers and practitioners with the aim of identifying cross disciplinary research and funding opportunities. This gives the perfect opportunity to share your ideas and identify possibilities for future collaborations this sandpit aims to challenge your conceptions of possible partnerships and how links between disciplines can create strong research teams.

**19.00 - Drinks in the lounge-** please come along and meet other arriving delegates

**20:00 –** A hot buffet will be served – please sign up and come along!

### Saturday 11<sup>th</sup> June

09:00 - 09:30 Registration and morning coffee outside the Sidlaw auditorium

#### **Morning Session (Chair – to be announced on the day)**

09:30 - 09:35 Welcome from Tom Black, Honorary Secretary

09.35 - 09:45 Introduction from the New BAHID President

09.45 - 10:15 **Dr Richard Shepherd – *The Five Ps of Pathology***

10:15 - 10.45 **Alistair Ruffel – *Geoforensics and the Search of Water and Land***

10.45 - 11.15 Coffee/tea in the Sidlaw foyer – please also take some time to consider the poster presentations there!

11.15 - 11.45 **Dr Chris Rynn** – *Facial Estimation, reconstruction and depiction: a series of case studies*

11.45 - 12.15 **Sherryn Ciavaglia** – *Blood, sweat and deer(s): using animal DNA evidence to aid wildlife crime investigation.*

12.15 -13.15 Buffet lunch in the foyer– soup, sandwiches, wraps, paninis etc.

### **Afternoon Session (Chair – to be announced on the day)**

#### **Student Presentations**

13:15 - 13:35 **Ryan Austin**, University of Lincoln - *Identifying the Missing; Utilising Strontium Isotopes for Geolocation; Finding the Voice of Guatemala's Forgotten.*

13:35 - 13:55 **Maria LeRoi**, University of Lincoln Graduate - *Faithfully Dead: Religion, Post-mortem Imaging and the Future*

13:55 - 14:15 **Viviane Freire Lira**, University of Dundee - *Age estimation in the living in a modern Roma population: preliminary results*

14:15 - 14:35 **Leisa Nichols-Drew**, University of Leicester - *From copper to court: translation from the research laboratory to the practitioner of a new methodology for revealing latent fingerprints on metal surfaces*

14.35 - 14:55 **Heather Black**, University of Strathclyde - *The influence of biomechanics on bruise formation*

14:55 - 15:15 Coffee/tea in the Sidlaw foyer – please also take some time to consider the poster presentations there!

15.15 – 15.45 **Professor Sue Black and Professor Niamh Nic Daeid** – *Leverhulme – a new Forensic Centre.*

15.45 - 16.15 **Alisdair McGill** – *Moving from Inspiration to Innovation.*

16.15 - 16.30 Announcement of the poster prize winners

16.30 - 16.55 Session close: Final thoughts, feedback and discussion

19:00 - 20:00 Wine and drinks reception in the main lounge

20:00 until late Buffet dinner in the Longforgan Room, followed by drinks

## Guest Speaker Biographies/Abstracts

### Dr Dick Shepherd



**Biography:** Dr Dick Shepherd is a consultant forensic pathologist who has been registered with the British Home Office for over 30 years. He has worked as a senior lecturer in Forensic Medicine at Guy's and St George's Hospital Medical Schools in London, and for the Coroners in West Yorkshire and Humberside, Merseyside, Cheshire, Lancashire and Cumbria. He has also spent time working for the State Pathologists Office in Dublin and in the Channel Islands.

Dr Shepherd was sent to New York to advise on the management of UK fatalities following 9/11 and to Bali following the bomb attack on the Sari Club. He was also the forensic pathology expert for the Bloody Sunday Inquiry, and for the inquiry and inquest into the deaths of Diana, Princess of Wales and Dodi Al Fayed. He has recently provided the Attorney General with a review of the forensic pathological aspects of the death of Dr David Kelly, a scientist employed by the British Ministry of Defense and formerly a United Nations weapons inspector in Iraq. He also worked on the controversial Rachel Nickell murder case in the UK.

Dr Shepherd has been involved in the investigation of natural, suicidal and homicidal deaths on behalf of both the defense and prosecution for more than 25 years, and has experience in the field of deaths in custody and during restraint. He has been a consultant pathologist for the Channel 5 show 'Autopsy' and can be seen exploring the reasons behind the deaths of celebrities including Karen Carpenter, Marilyn Monroe and Robin Williams.

Most recently he has accepted the position as Honorary President for BAHID and we look forward to learning more about his work and to sharing our own experiences with him.

## **Alistair Ruffel - Geoforensics and the Search of Water and Land**

**Biography:** Alastair is a Reader at Queen's University, Belfast and works mainly on Geoforensics, especially the use of remote sensing and geophysics in searching the ground. Such searches maybe for toxic waste, human bodies or buried weapons/contraband. He has a special interest in searching water and peat (wetlands).

**Abstract:** This presentation will describe and discuss various recent technological innovations that may assist in the search for, and recovery of human remains. This will include the large scale use of aerial LiDar in mapping ground terrain. At the meso-scale, the conjunctive use of Sonar and water-based ground penetrating radar (WPR) in searching waterbodies will be described with case studies.

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## **Dr Chris Rynn - Facial Estimation, reconstruction and depiction: a series of case studies**

**Biography:** Dr Chris Rynn is a craniofacial anthropologist based at the University of Dundee, where he is the Course Convenor for the Master of Science in Forensic Art. He was the co-editor for Craniofacial Identification published in 2012 and has a number of publications in the field. He is an expert in craniofacial approximation/reconstruction and anthropology, and in forensic image enhancement and analysis. He was a DVI course facilitator for CAHID and the UK Police until working on FastID, an Interpol project funded by the European Commission.

**Abstract:** Several recent forensic cases involving postmortem facial estimation and depiction will be presented. In concept, there is a difference between forensic facial approximation/reconstruction, using the bare skull to estimate facial shape; and postmortem depiction, using the remaining soft tissues to depict the facial surface, texture and colour. In practice, each case involves a unique combination of techniques depending on the state of decomposition of the remains.

## **Sherryn Ciavaglia - Blood, sweat and deer(s): using animal DNA evidence to aid wildlife crime investigation.**

**Biography:** With an interest in Archaeology and Genetics during my undergrad, I conducted my Honours year at the Australian Centre for Ancient DNA, working to identify the haplogroup of origin of human bones and teeth that I collected from Central America. I then gained employment with Forensic Science SA, the South Australian state forensic laboratory as a forensic biology reporting officer. After two and a half years working full time at FSSA, I dropped half time to take on a PhD under the supervision of Prof Adrian Linacre, a native of Edinburgh and forensic scientist/blood pattern analyst with whom some of you might be familiar. My PhD project has involved the development of new forensic DNA assays for wildlife species with a focus on the Australasian Carpet Python. This specialisation has led to my current job at Science and Advice for Scottish Agriculture in Edinburgh, where I am employed in the Wildlife DNA Forensic unit to conduct wildlife forensic casework involving DNA analysis and develop and validate testing for new species.

**Abstract:** Forensic DNA analysis of wildlife species is a recently emerged and steadily growing discipline within forensic science. Edinburgh is home to a dedicated wildlife DNA forensic laboratory that assists criminal investigations in the UK involving wildlife. This talk will provide an introduction to the field of wildlife forensic DNA analysis, give a flavour of the types of wildlife crimes encountered in Great Britain and illustrate with case studies the ways in which wildlife DNA forensic analysis can assist UK law enforcement efforts.

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## **Professor Sue Black and Professor Niamh Nic Daeid Leverhulme – a new Forensic Centre.**

**Abstract:** In 2015, the University of Dundee was awarded a £10M research grant by the Leverhulme Trust to disrupt the forensic science research ecosystem. This presentation will discuss the background against which such changes are set and will outline the way in which the Centre intends to address some of the issues facing forensic science in the modern world.

## **Alisdair McGill - Moving from Inspiration to Innovation**

**Biography:** Alisdair McGill is Founder and CEO of Ashton McGill, a design and innovation company based in Dundee & Glasgow. He is also Entrepreneur in Residence at the University of Dundee.

Alasdair has spent the past 25 years running businesses in a variety of industries, including construction, IT, professional services, and retail. A keen cyclist, he also sits on the Board of Scottish Cycling, the governing body for the sport.

Having originally trained as an accountant, Alasdair has spent the last 10 years training as a designer and now spends his time helping clients harness the power of design thinking to transform their organisations.

**Abstract:** In a world that is changing faster than ever, how do we keep pace and continue innovating? What is the type of thinking we need to use to imagine and create the future? This talk will explore those questions and challenge you to think differently.

## **Abstracts: Student Oral Presentations**

### **Identifying the Missing; Utilising Strontium Isotopes for Geolocation; Finding the Voice of Guatemala's Forgotten**

Ryan Austin - University of Lincoln

Supervisors - Dr Lucy Easthope, Gillian Fowler and Marco Perez

My research focuses on using Inductively Coupled Plasma-Mass Spectrometry to analyse hair, teeth and bone of individuals involved in Guatemala's internal conflict. This spanned for 36 years ending in 1996 with the signing of the Peace Accords. Identification using primary identifiers such as DNA can be problematic. Often conditions of the burial mean a sample cannot be collected and in some instances families refuse to provide a reference, fearing repercussions from the government. Therefore, secondary identifiers such as personal effects are often used, but unlike DNA these methods can be subjective. Research is showing that isotopes can provide geographical information regarding an individual's environment, creating an exciting opportunity to provide an alternative and empirical secondary identifier. Strontium, specifically the ratio 87/86 is being utilised in this research as it is dependent on the local environment. Strontium mimics calcium meaning strontium isotopes from food, water and surrounding bedrock manifest in the body's hard tissues, creating a unique ratio. By analysing these tissues, it is possible to build a timeline of where an individual resided throughout their life. Hair (provides a month by month analysis, 1cm of growth per month), teeth determine where the individual was born and bone the last 15-20 years of life. This is forensically significant as isotopic data can help reaffirm antemortem information. Humanitarianly, returning individuals to their respective communities ensures they are buried with the appropriate rights, an integral part of Mayan culture. A scientific project fulfilling a humanitarian aim, aiding in the identification of the Missing.

# Faithfully Dead: Religion, Post-mortem Imaging and the future

Maria LeRoi

University of Lincoln Graduate

Increasingly, objections to autopsy on religious grounds can be accommodated through the use of post-mortem imaging. The Rotzstein case has established that post-mortem imaging can be utilised in the autopsy process to accommodate religious practices surrounding the dead. The availability of guidance and standards for professionals and practitioners requires the use of education to consolidate the advantages and limitations of post-mortem imaging. Subsequently, post-mortem imaging has been seen as a way of preserving the integrity of the body whilst obtaining the information required to determine the cause of death. It provides a record of the deceased. More and more, post-mortem imaging is opening up new ways of working for forensic practitioners, especially pathologists, radiologists, anthropologists and coroners. Developing this area of forensic practice could have great implications for forensic autopsies, disaster victim identification, anthropologists, coroners and the education of the next generation of forensic practitioners. Post-mortem imaging has proven its potential within the field of disaster victim identification. Additionally, it has great potential to inform the future of education with the forensic sciences. With an increased use of post-mortem imaging comes an increasing volume of datasets. Comparison with traditional autopsy findings can refine the limitations and establish 'gold standards' for post-mortem imaging. Increasingly, imagery obtained from post-mortem imaging could potentially be used to produce educational resources for the instruction of a variety of forensic specialties. By utilising the increasing amount of data obtained from post-mortem imaging we can inform the future education of forensic practitioners and the next generation.

## **Age estimation in the living in a modern Roma population: preliminary results.**

Viviane Freire Lira, Catalin Dogaroiu, Lucina Hackman and Sue Black

University of Dundee

Age estimation in the living aims to establish chronological age based on radiological examination of the skeletal or dental development of a person who is unable or unwilling to prove their age by documentation. Approximately 1.5% of the Roma in Romania do not have a birth certificate and 1.9% do not have an identification card. The absence of personal documentation prevents their access to public services such as health care. It is known that Roma children have a higher rate of vitamin deficiencies, malnutrition and rickets than their non-Roma peers. Those factors are important to be taken into consideration when undertaking age estimation assessment, because a less favourable nutrition can result in a significant retardation of skeletal development. Most of the methods widely used in skeletal age estimation were developed using data from populations that experienced a higher socioeconomic status than the Roma population. Therefore, it is necessary to establish which methods that estimate age via the skeletal maturity of the hand demonstrate the reliability necessary to estimate age in living individuals from this population. This research aimed to evaluate the applicability of the Greulich and Pyle (1959) atlas for age estimation from a contemporaneous, Romanian based Roma population. The X-rays used were obtained through collaboration with the Mina Minovici Medical Legal Institute in Bucharest and were derived from age assessment cases between the years 2009-2014. A total of 464 individuals (240 males and 224 females) between 1 to 21 years of age were considered suitable for this study.

# **From copper to court: translation from the research laboratory to the practitioner of a new methodology for revealing latent fingerprints on metal surfaces**

Leisa J. Nichols-Drew, Professor A. Robert Hillman, Jodie Coulston

University of Leicester

There has been a renaissance in the innovation of physicochemical methods for the visualisation of latent fingerprints, but the challenge is their translation into the operational context. The situation is highlighted by the inclusion of a number of “category C” methods (emerging technologies) in the CAST Fingerprint Visualisation Manual: their exploitation is presently restricted by the need for forensic laboratories to satisfy ISO17025 and associated validation. This presentation will discuss an innovative approach to this problem.

The technology in question is galvanic silver deposition method for copper-containing metallic surfaces. An independent review was undertaken, using a non-fingerprint practitioner from a Forensic Service Provider, whose career background enabled the focus on five key criteria: safety, effectiveness, cost, application and chemical longevity. A standard operating procedure has been written and, subsequent to review by fingerprint experts, a validation plan developed. Communication to police forces and government agencies has resulted in visits to operational laboratories to demonstrate the technology. Consultation reveals significant operational potential, notably in the development of marks previously not viable for casework.

Ultimately, this method promises identifications in offences as diverse as metal theft, violent crime and wildlife crime. The results of an upcoming review by CAST from the Home Office will also be discussed. It is envisaged that this short term project will be an exemplar to others in promoting research to the end users and implementation within the Criminal Justice System.

# The influence of biomechanics on bruise formation

Heather Black

University of Strathclyde

Contusions, or bruises, are injuries commonly observed within cases of assault. However, their interpretation is currently subjective, with the mechanics of their formation and how this affects their appearance over time, not completely understood.

Research in this area is limited, with the primary aim being to reduce the subjectivity of visual interpretation. It is primarily focussed on colour pattern identification, with the most success being found using the L\*a\*b\* system, where similar patterns were identified between individuals. However, with tools such as spectrophotometry being used for measurement (Mimasaka et al. 2010), a more simplistic approach of digital photography would be more appropriate.

Visible light photography is the current method used for documenting contusions, however skin reflectance can cause inaccurate colour observation and reduce bruise visibility within images. The use of cross-polarisation and IR photography, could reduce this problem and even identify bruising not visible to the naked eye (Baker et al. 2013).

Studies investigating the mechanics of bruise formation are limited. Pilot work has shown that tissue response varies significantly between two individuals, whilst also influencing the severity of bruising observed. A more extensive study is required to determine which factors, including age and BMI, influence both the tissue response (e.g. impacting force), and resultant bruising. Following ethical approval, blunt impacts are delivered to the thigh of volunteers under controlled conditions. High speed video recordings will allow for impact force estimation, while colour, cross-polarised and IR photography will be used to document and identify contusions.

## References

- Baker, H.C., Marsh, N. & Quinones, I., 2013. Photography of faded or concealed bruises on human skin. *Journal of Forensic Identification*, 63(1), pp.103–125.
- Mimasaka, S. et al., 2010. Spectrophotometric evaluation of the age of bruises in children: measuring changes in bruise color as an indicator of child physical abuse. *The Tohoku Journal of Experimental Medicine*, 220(2), pp.171–175.

## **Abstracts: Student Poster Presentations**

### **Age Dem Bones: Dental Development & Diaphyseal Long Bone Lengths**

Burrell, Carla L., Dove, E.R., Irish, J.D., & Emery, Michael M.

Liverpool John Moores University and Poulton Research Project

Age-at-death estimates for sub-adult remains are typically derived through the analysis of dental development and diaphyseal long bone growth. Both methods are based on physiological age, which can be calibrated with chronological age by analyses of reference populations with known age-at-death. Diaphyseal long bone growth was analysed in three sub-adult populations: the Georgian/Victorian Spitalfields Coffin-Plate Collection (n=78), for which age-at-death is known, the urban Medieval St. Owen's Church Collection (n=34) and the rural Medieval Poulton Chapel Collection (n=169). For the Spitalfields Collection, known chronological age was compared with the diaphyseal lengths of the humeri, ulnae, radii, femora, tibiae, and fibulae. Diaphyseal lengths from the other collections were compared to the seriated developmental rank order of their dentition.

For all metrics, Spearman's rank correlation coefficients were high (Spitalfields,  $\rho_s = 0.938 - 0.972$ ; St. Owen's Church,  $\rho_s = 0.833 - 0.999$ ; Poulton Chapel,  $\rho_s = 0.966 - 0.999$ ) and significant (all  $p = <0.001$ ). Long both growth appears to be curvilinear, with accelerated growth rates early and again after puberty. However, a reduced rate of growth is apparent for the Spitalfields and St. Owen's Church Collections in comparison to the rural Poulton Chapel Collection. This is likely related to the standards of urban living relative to the rural lifestyle. As a whole, these results demonstrate the reliability of using diaphyseal lengths as a method for developmental and therefore chronological age estimation in subadult remains although care must be taken for ontological variability between populations, supporting the use of dental seriation for each collection.

## **Did they have a bun in the oven? A new grading system for assessing the pre-auricular sulcus**

Canty, Sarah E., Eliopoulos, Constantine, Gonzalez, Silvia & Borrini, Matteo

Liverpool John Moores University

The aim of the research was to examine the effects of sex and parity status on the pre-auricular sulcus. Physical anthropologists, anatomists and clinicians have long suggested that pregnancy and parturition may leave 'scars' on the skeleton, especially the *os coxae*. However there has been much debate and no clear method for examination has been established. Two English medieval skeletal collections were examined in this research, the Poulton collection (n=59) and the St Owens Church Gloucester collection (n=108) both housed at Liverpool John Moores University. A grading system was constructed to examine the different types of sulcus, ranging from Grade 0-4. Grade 0 was given when no pre-auricular sulcus was present and Grade 4 for a large, well-defined sulcus that was characteristic of pregnancy 'scars'. The age and sex of the individual was also recorded as well as the maximum length and width of the sulcus.

The results showed a significant difference in the occurrence rates of the pre-auricular sulcus in males and females. A pre-auricular sulcus was present in 91.3% and not present in 8.8% of females while for males, pre-auricular sulci were present only in 39.5% of cases and not present in the majority, 60.5%. The research not only indicates that the pre-auricular sulcus is a sexually dimorphic trait that could be scored, but also suggests the parity status could affect its morphology. This conclusion is supported by the absence of Grades 3 and 4 in male subjects as they were only found in females that could have been parous.

## Updating Standard Protocols for Age-at-Death Estimations from the *Pars basilaris*

Davenport CAL, Ohman J, Gonzalez S, Borrini, M

Liverpool John Moores University

A sample of 137 sub-adults from known and seriated age-at-death collections were assessed to update standard age estimation protocols from the unfused *pars basilaris* of the occipital bone. Measurements taken from the *pars basilaris* were correlated with the age-at-death of each individual to determine if there was a correlation between growth and age. There was a significant positive correlation ( $p < 0.001$ ) present for all measurements taken, leading to mean measurements and standard deviations being calculated for each age group.

The *pars basilaris* is affected very little by environmental conditions, most likely due to the proximity to the brain and spinal column. However, developmental and pathological conditions that affect the morphology of the cranial vault have not previously been considered when aging using this method. Considerations also need to be taken when assessing individuals with low birth weights, in particular, those from multiple births as the assessment will most likely produce lower age ranges. Further testing with modern day known collections is recommended to further increase the sample size and forensic relevance of this technique. Measurements taken from CT scans will test the suitability for use on living populations where age of an individual is in dispute. Overall, age estimations from the *pars basilaris* continue to be promising, especially in cases where dental development cannot be assessed due to the incompleteness of human skeletal remains.

## **Digging Up Dirt: Using ArcGIS® Mapping Techniques to Aid Cost Effective Sample Selection for Analytical Testing**

Davenport, CAL, Reynolds, L, Rennie, SR, and Ohman, JC.

Liverpool John Moores University

It has long been recognised that forensic anthropologists and archaeologists need to use a wide range of skills to build a picture of the events that led up to the deposition of human material. However, preservation studies on human skeletal remains have focused on the osteology without taking into account the factors that affect it. Looking for and recording the colour changes in the soil that indicate a grave is traditionally all that is recorded, but what if there is more that can be learnt from the soil surrounding the grave site?

When excavating a mass grave, single burial or cemetery population, various observations made of the skeletal remains and samples taken of the soil, vegetation and organics surrounding the burial. By mapping the soil and osteological data in ArcGIS to produce a site profile, an understanding of the taphonomic environment affecting the preservation of human remains can be ascertained. Therefore, providing an indication of skeletal elements suitable for further analytical testing such as, stable isotopes, carbon dating and DNA extraction.

Using multi-disciplinary techniques, to minimise the potential for poor results, will enable forensic anthropologists and archaeologists to make informed decisions on how and where to sample from a site and/or skeleton. This ensures expensive tests are not carried out unnecessarily, therefore increasing the yield from analytical tests when funds for testing are limited by budget and time constraints.

*\*This poster has been presented at a previous BAHID Conference (December 2014) and is re-presented here for information and feedback purposes only due to the next phase of testing being undertaken this summer. This poster is not student prize eligible.*

# Facial identification from online images for use in the prevention of child trafficking and exploitation

Ching Yiu Jessica Liu

The Department of Computer Sciences & Facelab (School of Art and Design),  
Liverpool John Moores University

Supervisory team: Prof. Caroline Wilkinson, Dr. Martin Hanneghan, Dr. Sud Sudirman

The National Center for Missing & Exploited Children (NCMEC) received a 432% increase in child sexual abuse images for purpose of identification between 2005 and 2009 (U.S. Department of Justice, 2010). But when rapid growth changes facial features, recognition is challenging in children under 15 years old.

First, this study aims to collect an open-access database of facial images documenting the different stages of facial growth from different individuals between ages 0-19 years old. There are very limited longitudinal databases as such within the research community, therefore the collection of this database will benefit researchers who wish to study age progression.

Ferguson (2015) suggests that facial recognition algorithms can be better than humans in identifying children's faces, this research takes a further step to explore how the difference in age group and age gap can affect the recognition rate of various facial recognition software.

Part 1 aims to explore the possibilities of n:1 verification by increasing the number of the source images using group tagging. Part 2 aims to explore if age progression work could further improve the recognition rate. Part 3 explores the recognition rate using facial averages. Part 4 explores identification using increased number of distractors.

## **Accuracy study of nose profile estimation method from the skull in Indonesian adult population**

Erli Sarilita, Christopher Rynn, Peter A Mossey, Sue Black, Fahmi Oscandar

CAHID, University of Dundee, Faculty of Dentistry, Universitas Padjadjaran, Indonesia and School of Dentistry, University of Dundee

This study investigated nose profile morphology and its relationship to the skull in an Indonesian adult population, with the aim of improving the accuracy of forensic facial reconstruction. A sample of 355 lateral head cephalograms from Universitas Padjadjaran Dental Hospital Bandung Indonesia was measured. Sexual dimorphism was clearly seen in all craniometric and nose profile dimensions: notably, males exhibited statistically significant larger values than females. The nose profile estimation method based on skull morphology previously proposed by Rynn et al. (2010) was tested in this study. In addition, regression formulae were derived to estimate nose profile dimensions based on the craniometric measurements. This derived method and the published method (Rynn et al, 2010) were compared to the actual nose profile dimensions of Indonesian individuals. The published method produced statistically significant mean differences between the actual and the estimated measurements in all nose profile dimensions in both male and female groups. The percentage of mean difference – actual mean ratio ranged from 2.94 – 16.91%. The derived method produced more accurate results than the published method. For the derived method, the percentage of mean difference – actual mean ratio decreased to a range of 0.3 – 4.81 %. This study demonstrates that the relationship between the morphology of the nasal aperture and that of the nose profile is different between the Indonesian population and the predominantly Caucasoid population from which the published method was derived. It is proposed that the regression equations derived herein from the Indonesian population would yield more accurate nasal profile estimation and should be used in the forensic facial reconstruction of an unidentified Indonesian individual. Future research will investigate the accuracy of both methods on skulls of related ancestry groups.

**THE PUBIC SYMPHYSIS: A Modern Day Osteological Assessment:  
*A Systematic Review of the Reliability of Digital Photographs as a  
means of Carrying out Age Related Morphology of the Pubic  
Symphysis when Employing the Suchey-Brooks Method.***

Claire Morton, Kerry-Ann Milic, Rahul Pathak

Anglia Ruskin University

The increasing global role of forensic anthropology in the assistance of medico-legal cases has become prevalent in the wake of mass genocide and war crimes. A modern approach for archiving evidence for the safe re-examination needs to be constructed. A plausible solution to this is through digital imaging. Additionally, observer error needs to be minimised when carrying out these examinations to prevent the misinterpretation of evidence. This study focuses on age estimation of the pubic symphysis, a region of bone that acquires developmental and degenerative characteristics as one ages and has been proven to be a key age indicator for victim identification.

This study assesses the suitability of digital photographs as a means of carrying out age determination on the pubic symphysis when employing the Suchey-Brooks method while critically analysing the inter-observer error between an experienced and inexperienced anthropologist when doing so. A comparison on 52 Suchey-Brooks scores were assigned to digital photographs and matched to the actual ages of DNA identified Bosnian male innominate bones. Secondly, observer and inter-observer error was undertaken and quantified using statistical measurements.

# Geo-temporal Analysis of Morphoscopic Sexing Traits of the Human Pelvis

Samuel R. Rennie, Margaret Clegg and Silvia Gonzalez

Liverpool John Moores University, U.K. and University College London, U.K.

With the progression of multivariate statistics, the creation of population specific equations is on the rise. Multivariate analysis generally revolves around metric methods or geometric morphometrics, not on morphological features.

A total of eight populations were analysed spanning from prehistoric American to modern day South African and ranged between pygmy populations from the Andaman Islands to Medieval British populations. With a sample size greater than 1100 individuals, each *os coxa* was scored using eight features most commonly used by physical anthropologists and osteoarchaeologists.

Trait frequencies were compiled and compared between each of the eight populations. Each population was then analysed using a Principal Components Analysis (PCA) where the 1<sup>st</sup> Principal Component (PC) was variation due to sex. This helped form a specific structure of the sexual variation seen in the population. To help analyse the differences between populations, a between-group Principal Component Analysis (bgPCA) was performed on all eight populations. This approach could, theoretically, separate populations in the context of sexual variation without over manipulating the data.

When comparing trait frequencies, slight differences between populations could be seen. Minor fluctuations between component scores for each trait could be seen when comparing the PCA analyses from each population. Results from the bgPCA state that no geographic and/or temporal differences can be observed in the sexual variation of the morphological traits.

This shows that when using morphoscopic features for sex estimation, applying multivariate techniques can be used without the knowledge of geographic or temporal origin with a high accuracy.

## **Age Estimation of the Pubis Symphysis using Suchey-Brooks: Direct Observation vs. Digital Images**

Lauren Spencer

Anglia Ruskin University

The use of digital images in forensic anthropology is a recent and controversial discussion, it is argued that images are not detailed enough and that the assessor should have experience with the Suchey-Brooks method previously. This study had 2 anthropologists with varying experience use the Suchey-Brooks method with digital images in order to determine whether or not digital images were accurate enough for use in the field and whether experience with the method was necessary. The left and right pubic symphyses were assessed separately in order to ascertain whether the morphological differences between them would produce different scores for each subject. Results from this study showed a very strong correlation (SRCC 0.99815) between the estimated ages for both the original and digital images from the experienced anthropologist. Moreover, a strong correlation (SRCC 0.99815) was seen between the estimated ages of both the experienced and inexperienced anthropologist using the digital images. The results from the left and right pubic symphyses showed that the use of digital images made it more likely for the assessor to give a subject's bones different scores, and the results also established that the left pubic symphysis was scored more accurately than the right.

## The importance of cranial reconstruction for human identification purposes

Satu Valoriani, Matteo Borrini

Liverpool John Moores University

Human remains are usually recovered fragmented from forensic contexts: taphonomic factors can occur in clandestine graves and on outdoor scenes. Thermal alterations can damage the cranial bones during fires as well as trauma and injuries. An incomplete or broken skull leads to a difficult identification of the individual and trauma interpretation.

To allow forensic experts (i.e. medical examiners, pathologists, forensic anthropologists) achieving all the information from the remains, a reconstructive approach is proposed. Reversible B-72 paraloid glue mixed with acetone is used to place the fragments together, while a reversible wax is applied to reconstruct the missing parts and stabilise the *cranium*. All the materials used are reversible and the reconstruction steps are documented to maintain the value of the forensic evidence.

The resulting skull will allow a more comprehensive examination of the trauma and injuries; furthermore, it will create a suitable support for CT and radiographic analysis as well as for facial reconstruction of unidentified bodies.

An additional value of this practice is the possibility to give back to the families completed remains: an important emotional implication particularly for human rights violation cases.

## Meet our Sponsors

BAHID would like to say a special thanks to the companies below, who have provided support towards this year's conference. Remember, you can purchase discounted Wiley Black-Blackwell books only via the BAHID Website.

### SRi FORENSICS

SRi Forensics is an essential resource when investigating and preparing your legal case. Our consultants have vast experience of the judicial process both in the UK and Abroad. Acting for both sides of the Justice System, SRi Forensics is highly regarded as an independent digital-forensics and evidential analysis expert witness company and SRi Forensics staff regularly act as expert witnesses in facial mapping, body image analysis, injury depiction as well as video and voice analysis.

For further information on how SRi Forensics can assist in these areas and many others, please visit us online at [www.sri-forensics.com](http://www.sri-forensics.com) or email direct to [info@sri-forensics.com](mailto:info@sri-forensics.com)

Sri Forensics have kindly contributed towards the student presentation awards.



BAHID is proudly associated with the Forensics Europe Expo. Forensics Europe Expo 3<sup>rd</sup>- 4<sup>th</sup> May 2017, Olymبيا, London is the only dedicated international forum for the entire forensics sector and supply chain to source forensic products, equipment and services, as well as providing the definitive source of education, best practice, training and networking.

The show will once again connect the widest range of forensic equipment and services suppliers with over 3,000 international visitors. As an exclusive offer available to BAHID members only, Forensics Europe Expo offers a 20% discount on all conference passes, with details available closer to the event date.

## Amenities

### Car Parking

Car parking is free to all delegates of the workshops and conference

### Dress Code

Smart casual will be the recommended mode of dress for all BAHID conference sessions and events. Be comfortable!

### Location of Meeting

All workshops and the conference will take place at Westpark Conference Centre.

**Telephone:** 01382 647171

**Email:** [enquiries@westpark.co.uk](mailto:enquiries@westpark.co.uk)

### Address:

319 Perth Road  
Dundee  
DD2 1NN

### Accommodation

West Park in Dundee is the perfect central base for exploring Scotland. Only 90 minutes away from 90% of Scotland's population, with the capital city of Edinburgh only 60 minutes away and the famous St Andrews Golf Course only 20 minutes away.

The bedrooms offer double, single and twin accommodation as well as a number of interconnecting rooms for families. There are also twelve accessible rooms. Each room has a private entrance and en-suite shower room with toilet, a workspace with a desk and chair, a flat screen TV, free Wi-Fi and tea and coffee making facilities. Toiletries and towels are provided. The rooms are fully serviced daily and kept to a very high standard. Perfect for a clean and comfortable stay.

Please call 01382 647171 to book, quote BAHID and reference number 24810 to get the preferred rate for the room. Room rates include full breakfast and VAT.

### Identification Badges

Upon registration, each delegate will receive a BAHID conference identification badge. Delegates should wear this badge at all times during the conference period.

### Smoking Policy

No smoking is permitted inside West Park but there are designated smoking areas outside the buildings, this includes the use of electronic cigarettes.

## Getting around

### By Rail

Dundee is on the main East Coast rail line. Direct services to major cities in Scotland (Aberdeen, Edinburgh, and Glasgow) are just over an hour away. The railway station is only a five-minute drive from West Park.

### By bus

The number 5 bus to Ninewells runs every five minutes from Nethergate, which is only a five-minute walk from Dundee Train Station. The bus stops opposite the conference centre.

### By taxi

There are taxi ranks throughout the city and immediately adjacent to the main railway and bus stations. The journey to the conference centre takes approximately five minutes.

### From Dundee Airport

Dundee Airport is three miles to the west of the city centre. The airport is only a five-minute drive from West Park. There are taxi ranks outside the airport.

### From the A90 North from Aberdeen

Entering Dundee from the A90, at the traffic lights turn right onto the Kingsway (A90). Follow the road until you reach the Swallow roundabout (4th roundabout) then take the first exit onto Riverside Drive. Continue along Riverside Drive (A85) for approximately one mile until you reach the next roundabout. Signposted for West Park from this point. Take the first exit (up a steep hill) and then take the first right onto the Perth Road. Continue along Perth Road, passing Fernbrae Hospital on your left; travel a further few hundred yards and West Park is located on the left hand side.

### From the A90 South from Perth/Edinburgh

At the first roundabout on the approach to Dundee take the third exit onto Riverside Drive. Continue along Riverside Drive (A85) for approximately one mile until you reach the next roundabout. Signposted for West Park from this point. Take the first exit (up a steep hill) and then take the first right onto the Perth Road. Continue along the Perth Road, passing Fernbrae Hospital on your left; travel a further few hundred yards and West Park is located on the left hand side.

### Using your Satellite Navigation system?

When driving to Westpark via satellite navigation, please use DD2 1NN as the postcode.

## Dates for the Diary

### 2016

5 <sup>th</sup> -7 <sup>th</sup> July	<i>FORREST 2016- 12<sup>th</sup> Annual Conference Forensic Research and Teaching, Glasgow, UK</i>
7 <sup>th</sup> -13 <sup>th</sup> August	<i>Annual IAI International Forensic Educational Conference, Cincinnati, Ohio</i>
11 <sup>th</sup> -12 <sup>th</sup> August	<i>5<sup>th</sup> European Meeting on Forensic Archaeology, Dublin, Ireland</i>
22 <sup>nd</sup> -23 <sup>rd</sup> August	<i>ICFS: 18<sup>th</sup> International Conference on Forensic Sciences, Paris, France</i>
5 <sup>th</sup> September	<i>Call for papers – BAHID Winter Conference</i>
1 <sup>st</sup> -5 <sup>th</sup> September	<i>FASE Basic Workshop in Forensic Anthropology, Coimbra, Portugal</i>
17 <sup>th</sup> -18 <sup>th</sup> September	<i>FASE Workshop: Essentials in Forensic Anthropology, Bali, Indonesia</i>
3 <sup>rd</sup> October	<i>Registration for BAHID Winter Conference opens</i>
4 <sup>th</sup> November	<i>Abstract Deadline (prov.) – BAHID Winter Conference</i>
2 <sup>nd</sup> December	<i>Registration Deadline (prov.) – BAHID Winter Conference</i>
Early December	<i>BAHID Winter Conference, Chancellors Hotel, Manchester</i>

### 2017

13 <sup>th</sup> -18 <sup>th</sup> February	<i>AAFS 69<sup>th</sup> Annual Scientific Meeting, New Orleans, Louisiana</i>
18 <sup>th</sup> -22 <sup>nd</sup> April	<i>AAPA 86<sup>th</sup> Annual Meeting, New Orleans, Louisiana</i>
3 <sup>rd</sup> -4 <sup>th</sup> May	<i>Forensics Europe Expo, Olympia, London</i>
May	<i>FAPSA Conference: details to be confirmed</i>
6 <sup>th</sup> -12 <sup>th</sup> August	<i>Annual IAI International Forensic Conference, Atlanta, Georgia</i>

## Notes