

II BIOANTHROPOLOGICAL MEETING: Life, death and in between

Programme | Abstract Book

May 29th - 30th, 2015



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Faculty of Sciences and Technology
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GRAPHIC DESIGN OF THE MEETING:

Tiago Carvalhinho[©]

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Committees

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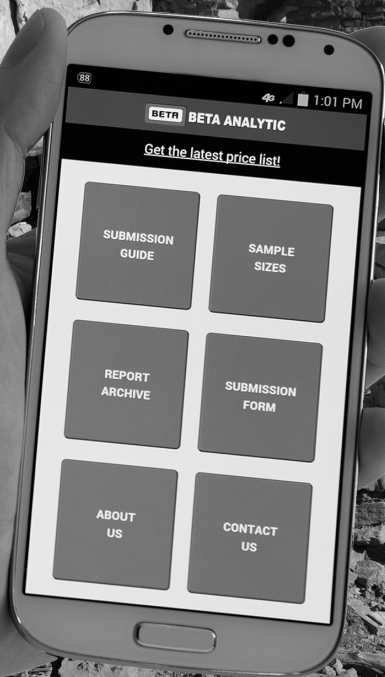


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Acknowledgments

Mrs. Célia Cardoso and Mrs. Adelina Gomes, for helping on the organization.

Tiago Carvalhinho, who was responsible for giving a “face” to the BAM.

PROGRAMME

8.00 Registration

9.00 Welcome reception



SESSION IN HUMAN EVOLUTION

Chair: Paulo Gama MOTA

09.30 Plenary Session - **The phylogenetic position of *Homo antecessor* in the Eurasian Human Evolution: a review eighteen years later**

José BERMÚDEZ DE CASTRO, CENIEH, Spain

10.15 **The modular nature of the Neanderthal thorax: the *status quo****

Daniel GARCÍA-MARTÍNEZ, Markus BASTIR

10.30 **The biting performance of *Homo heidelbergensis* vs *Homo sapiens****

Ricardo Miguel GODINHO, Laura FITTON, Paul O'HIGGINS

10.45  **COFFEE-BREAK**

11.05 **POSTER SESSION (ODD NUMBERS)**

11.40 **The origin of Homo ca. 2.8 Ma in the Ledi Geraru research area (Afar, Ethiopia)***

Ignacio LAZAGABASTER, Ellis LOCKE, Irene SMAIL, John ROWAN, Dominique GARELLO, Chalachew SEYOUUM, Joshua ROBINSON, Eric SCOTT, David FEARY, Christopher CAMPISANO, Brian VILMOARE, William KIMBEL, Erin DIMAGGIO, Guillame DUPONT-NIVET, Alan DEINO, Faysal BIBI, Margaret LEWIS, Antoine SOURON, Lars WERDELIN, David BRAUN, Ramon ARROWSMITH, Kaye REED

11.55 Human Evolution teaching within a context of non-formal education: a course for high school students

Richard MARQUES, Ana SANTOS-CARVALHO, Eugénia CUNHA, Ana Luísa SANTOS, Ana Maria SILVA, Cláudia UMBELINO, Davide DELFINO, Nelson ALMEIDA, Paulo GAMA MOTA, Sónia FERREIRA

12.05  **LIGHT LUNCH**



SESSION IN POPULATION GENETICS

Chair: Manuela ALVAREZ

13.45 Plenary Session - Long-term balancing selection in the great apes

João TEIXEIRA, Max Planck Institute, Germany

14.30 Association study of VNTR polymorphisms in 5-HTT (SLC6A4) gene with obesity risk in students from the University of Coimbra*

Helena DIAS, Magdalena MUC, Cristina PADEZ, Licínio MANCO

14.45 The human maternal ancestry of the Indian Subcontinent*

Marina SILVA, Marisa OLIVEIRA, Luísa PEREIRA, Pedro SOARES

15.00 Investigating the maternal demographic history of an ancient human population in Southwest Turkey*

Rita RASTEIRO, Claudio OTTON, Rinse WILLET, Johan CLAEYS, Peter TALLOEN, Katrien VAN DE VIJVER, Reyhan YAKA, Lounès CHIKHI, Jeroen POBLOME, Ronny DECORTE

15.15 Identification of subclades within Y-chromosome haplogroup J in the Portuguese population*

Joana ALBUQUERQUE, Rui MARTINIANO, Licínio MANCO

15.30



COFFEE-BREAK



SESSION IN HUMAN ECOLOGY

Chair: Cristina PADEZ

15.50 **Plenary Session - Metabolic disease in migrant populations of South Asian origin: competing explanations**

Tessa POLLARD, University of Durham, United Kingdom

16.35 **Poverty, health and health inequalities***

Helena NOGUEIRA, Ana Cláudia LOURENÇO

16.50 **“In the between” or a particular portrayal of (a) human life**

Maria Jorge FERRO, Telma RODRIGUES, Bernardo FERREIRA

17.05 **Nutritional status of the Riverine population of the Caxiuanã National Forest, Melgaço-Pará, Brazil***

Ligia Amaral FILGUEIRAS, Hilton PEREIRA DA SILVA

17.20 **Daytime sleepiness and caffeine intake in Portuguese University students**

Maria Raquel SILVA, Teresa PAIVA

17.35 **If you fear death, anxiety will haunt your life - so, let a story cherish your dreams**

Maria Jorge FERRO, Luiza Nobre LIMA

17.50 **Changes in television viewing, computer use and walk to school among elementary school-aged children in Portugal from 2002 to 2009**

Cristina PADEZ

18.05 **Social determinants of health and Sickle Cell Disease in Amazonia***

Ariana SILVA, Hilton PEREIRA DA SILVA

20.00



SOCIAL DINNER (OPTIONAL)

END OF DAY ONE



SESSION IN PRIMATOLOGY

Chair: Renata MENDONÇA

9.00 Plenary Session - The evolutionary origins of Human Cognition: insights from research on chimpanzees

Tetsuro MATSUZAWA, University of Kyoto, Japan

9.45 The diet of the chimpanzees at Caiquene-Cadique, Guinea-Bissau: from cashew to snails*

Joana BESSA, Cláudia SOUSA, Kimberley HOCKINGS

10.00 Dispersal in the Desert: genetic diversity and population structure of the Guinea baboon (*Papio papio*) in Mauritania*

Vitor SILVA, Maria Joana SILVA, José Carlos BRITO

10.15 Is sexual dimorphism in cranial form associated with sexual dimorphism of masticatory function? An approach using finite elements analysis and geometric morphometrics on two papionin species

Miguel PRÔA, Laura C. FITTON, Paul O'HIGGINS

10.30 Mother-infant behavior in wild Bornean orangutans in a great apes perspective

Renata MENDONÇA, Tomoko KANAMORI, Misato HAYASHI, Tetsuro MATSUZAWA

10.45  **COFFEE-BREAK**



SESSION IN ANTHROPOLOGY OF PAST POPULATIONS

Chair: Ana Maria SILVA

11.00 Plenary Session - Basque “oral history” from a dental anthropological perspective

Richard G. SCOTT, University of Nevada, Reno, USA

11.45 An experimental reconstruction of cremation rituals in the ancient Veneto area: preliminary results*

Giovanni MAGNO

12.00 Can a database with pathology be healthy for research? The inclusion of data considering paleopathological information in the bioarchaeology database

Filipa NETO, Ana SEABRA

12.15 Funerary contexts: some ideas on the problem of children representation and on evidence of family and affective ties in death*

Bruno MAGALHÃES, Ângela ARAÚJO

12.30 Dental enamel hypoplasia in a Medieval Portuguese sample from Coimbra and its possible etiology

Liliana CARVALHO, Sofia N. WASTERLAIN

12.45 Osteoarthritis and Musculoskeletal Stress Markers (MSM) as indicators of occupational stress in a Catalan Cistercian Community*

Núria MONTES, Maria Eulàlia SUBIRÀ

13.00  *LIGHT LUNCH*

Chair: Ana Luísa SANTOS

14.15 A kidney's ingenious path to trimillennar preservation: renal tuberculosis in an Egyptian mummy ?

Carlos PRATES, Carlos OLIVEIRA, Sandra SOUSA, Salima IKRAM

14.30 “By any other name”: procedures for establishing terminology in bioarchaeology

Cristina CRUZ, Ana SEABRA, Filipa NETO, Margarita CORREIA

14.45 Paleoparasitological studies in Portugal: first results

Luciana SIANTO, Daniela CUNHA, Sergio CHAVES, Isabel TEIXEIRA-SANTOS, Paula PEREIRA, Ricardo GODINHO, David GONÇALVES, António MATIAS, Vítor MATOS, Sara LEITÃO, Ana Luisa SANTOS

15.00 Bone mass in young skeletal women: what's love got to do it?

Francisco CURATE, Eugénia CUNHA, Ana TAVARES, Anabela ALBUQUERQUE

15.15 The bigger you are the faster you age? Analysing body size effects on age-related criteria from the hip bone joints*

Vanessa CAMPANACHO, Andrew CHAMBERLAIN, Pia NYSTROM, Eugénia CUNHA

15.30 The paleopathology of rib cage fistulae: challenges and pitfalls

Vítor MATOS, Carina MARQUES, Francisco CURATE, Célia LOPES

15.45 CraMs: new tool to help anthropologists*

Catarina COELHO, Daniel SANTOS, Luis NEVES, Hélder SANTOS, Paulo DIAS, Beatriz SOUSA, Maria Teresa FERREIRA

16.00 **A possible Madura foot from medieval Estremoz, southern Portugal***

Ana CURTO, Teresa FERNANDES

16.15 **Biological affinities between Portuguese and North Africans: dental nonmetric trait analysis***

Luís Miguel MARADO, Joel D. IRISH, Ana Maria SILVA

16.30  *COFFEE-BREAK*

POSTER SESSION (EVEN NUMBERS)



SESSION IN FORENSIC ANTHROPOLOGY

Chair: Eugénia CUNHA

17.00 **Plenary Session - Forensic Anthropology: Bones, but not just bones**

Niels LYNNERUP, University of Copenhagen, Denmark

17.45 **Intra-skeletal variation in microbial invasion of bone and the influence of adipocere development***

Amanda HALE

18.05 **Taphonomic alterations of animal bone induced in different standardized soil conditions: biomechanical pilot study***

Adrianna LACEL, Celina PEZOWICZ, Zofia SPIAK, Renata RYL,
Stanisław GRACZYK

18.15 Human identification in context of catastrophe: preliminary report on the remains recovered from de Parish Cemetery of Penco, Chile

Ricardo GOMES, Erika REYES, Camila GUERRA, Carlos JÁCOME

18.30 What can we learn from compensatory movement?*

Maria Alejandra ACOSTA, Maria Teresa FERREIRA, Eugénia CUNHA

18.45 A deep sewers murder investigation: a case of successful teamwork between forensic pathologist and forensic anthropologist*

José Vieira de SOUSA, Gonçalo CARNIM, Maria C. de MENDONÇA

19.00 CLOSING SESSION

[*Running for the award for best oral communication]

POSTER PRESENTATION

- 1 | The environmental context of early Homo at Ledi-Geraru (Afar, Ethiopia) ca. 2.8 Ma: an assessment of the faunal community***
Ignacio A. LAZAGABASTER, Irene SMAIL, Ellis LOCKE, John ROWAN, Joshua ROBINSON, Eric SCOTT, Lars WERDELIN, Kaye E. REED
- 2 | Association of the lactase -13910C>T polymorphism (rs4988235) with BMI and fat-mass in a sample of students from the University of Coimbra, Portugal***
Helena DIAS, Magdalena MUC, Cristina PADEZ, Licínio MANCO
- 3 | Comparative study of genetic and anthropological methods for the determination of the sexual gender in a Medieval collection of skeletonized individuals***
Joana LOPES, Heloísa Afonso COSTA, Cláudia Vieira DA SILVA, Teresa RIBEIRO, Maria João PORTO, Cláudia UMBELINO, Eugénia CUNHA, António AMORIM
- 4 | A study of 5 - HTT (SLC6A4) gene polymorphisms and antisocial behaviour in a population sample of young Portuguese adults***
Ana SOARES, Manuela ALVAREZ, Sofia N. WASTERLAIN, Licínio MANCO
- 5 | Discrete dental traits of a Portuguese population, from Montijo (Portugal)**
Soraia BATISTA, Fátima ALMEIDA
- 6 | Social stratification of aging and health: mortality pattern at Coimbra municipal cemetery between 1884 and 1910**
Joana MARQUES, Helena NOGUEIRA, Goreti CORREIA, Manuela ALVAREZ
- 7 | Suicide rates variation in mainland Portugal across the 20th century**
Ariana PINTO, Sara FREITAS, Fábio RESENDE, Fernando FLORÊNCIO, Helena NOGUEIRA, Manuela ALVAREZ
- 8 | Gender differences in sports involvement: a case of children's self-stereotyped ideas**
Daniela RODRIGUES, Cristina PADEZ

- 9 | **The ketogenic diet: implications for athletes' health and performance**
Maria-Raquel G. SILVA
- 10 | **Social behaviour in a captive chimpanzee (*Pan troglodytes*) group: gender and age roles**
Fátima ALMEIDA, Catarina CASANOVA, Cecília VERACINI
- 11 | **A possible treponemal infection in a young adult from medieval/modern Tomar, Portugal***
Alexandra CAMELO, Ana CURTO, Teresa FERNANDES, Sónia FERRO
- 12 | **A non-union fracture in an ulna from a Bronze Age skeleton exhumed/uncovered from Torre Velha 3 (Portugal)***
Maria João COELHO, Ana Maria SILVA
- 13 | **Intraskkeletal heterogeneity of bone mineral density**
Francisco CURATE, Tânia FERREIRA, Carina MARQUES, Vítor MATOS
- 14 | **A slipped capital femoral epiphysis case study from medieval Estremoz, Portugal***
Ana CURTO, Teresa FERNANDES
- 15 | **A possible case of *Humerus varus* in a female skeleton from the Visigoth necropolis at Villa Rosa Palace in Santarém**
Vitória DUARTE, Ana Maria SILVA
- 16 | **Pseudoarthrosis in the left ulna of an individual from the medieval necropolis of Largo Cândido dos Reis, Santarém (Portugal)***
Pedro FERNANDES, Ana Maria SILVA
- 17 | **A possible case of slipped femoral capital epiphysis in a Middle Bronze Age Skeleton from Portugal (Torre Velha 3, Serpa)***
Daniel FIDALGO, Ana Maria SILVA, Eduardo PORFÍRIO
- 18 | **Sex determination using permanent tooth dimensions in adults and non-adults from a Medieval osteological collection exhumed from São Martinho (Leiria)***
Sara GASPAS, Susana GARCIA

19 | Defects of the atlas from 16th century Sardinia (Italy)

Valentina GIUFFRA, Federica CHIRCO, Andrea MONTELLA, Marco MILANESE, Eugenia TOGNOTTI, Pasquale BANDIERA

20 | A case of Camurati-Engelmann disease from 16th century Sardinia (Italy)

Valentina GIUFFRA, Chiara SPIGA, Andrea MONTELLA, Raffaella BIANUCCI, Marco MILANESE, Eugenia TOGNOTTI, Davide CAMELLA, Gino FORNACIARI, Pasquale BANDIERA

21 | Evaluation of the potential of odontometry for sex estimation on burned human skeletal remains*

Márcia GOUVEIA, Inês SANTOS, Ana Luísa SANTOS, David GONÇALVES

22 | Preliminary study of ulnar styloid fractures in a sample of the 19th and 20th centuries Portuguese population

Giovanni MAGNO, Susana GARCIA

23 | Experimental Archaeology: analysis of calcined pig bones burned following the Ancient Veneti uses by Photometric Scanner Imaging (PSI), and Fourier Transform InfraRed (FTIR) spectroscopy*

Giovanni MAGNO, Chiara STANI, Fernando FERMI, Maria Grazia BRIDELLI

24 | Unveiling the evidences of neoplasm in the Coimbra and Lisbon reference skeletal collections

Carina MARQUES, Vítor MATOS, Albert ZINK, Eugénia CUNHA

25 | Study of bone changes in a sample of shoemakers, tailors and seamstresses from Coimbra: inferences for activity*

Ana Filipa MAXIMIANO, Ana Luísa SANTOS, Charlotte Yvette HENDERSON

26 | A matter of life and death: microscopic paleopathological study of Portuguese children's sample from 19th to 20th centuries*

Álvaro MONGE, Ângela ARAÚJO, António MATOS, Ana Luísa SANTOS

27 | Exposed-plane-form enamel defects in a child from the founding wheel of Santa Casa da Misericórdia, Faro, Portugal (16th-19th centuries)

Joana PAREDES, Maria Teresa FERREIRA, Sofia N. WASTERLAIN

- 28 | **A possible case of meningitis in a young child, from the medieval/modern necropolis in Santa Maria do Olival, Tomar (Portugal)**
Cláudia RELVADO, Teresa FERNANDES, Eugénia CUNHA
- 29 | **Ectopic upper canines in bioanthropology: case-study of two individuals from the archaeological collection of slaves from Lagos (Portugal)***
Ana Isabel RUFINO, Maria Teresa FERREIRA, Sofia N. WASTERLAIN
- 30 | **The potential of Cementochronology for age-at-death estimation in burned teeth***
Inês SANTOS, Márcia GOUVEIA, Eugénia CUNHA, David GONÇALVES
- 31 | **Preliminary anthropological study of the Roman necropolis of Monte Carru-Alghero (Sardinia - Italy)**
Rita Maria SERRA, Valeria POMPONI, Daniela ROVINA, Alessandra LA FRAGOLA, Andrea MONTELLA, Maria Alessandra SOTGIU, Vittorio MAZZARELLO, Antonio BRUNETTI, Pasquale BANDIERA
- 32 | **Paleoparasitological analysis of Roman sewers from *Augusta Emerita* (Mérida, Spain)**
Luciana SIANTO, Ana Luísa SANTOS, Jesus Acero PÉREZ
- 33 | **Is it possible to apply standardized decomposition stages when estimating the PMI of buried remains?***
Ines BUEKENHOUT, Liliana CRAVO, Maria Teresa FERREIRA, Duarte Nuno VIEIRA, Eugénia CUNHA
- 34 | **Size of mandibular canines as a tool for sex diagnosis in a Chilean population**
Daniela CARRASCO, Ricardo GOMES
- 35 | **Sex Diagnosis through automated 3D Geometric Morphometrics of the Tali bones***
João COELHO, David NAVEGA, Eugénia CUNHA

36 | Child death in Portugal: an anthropological view*

Andreia FONSECA, Rosa HENRIQUES DE GOUVEIA, João PINHEIRO, Duarte Nuno VIEIRA, Eugénia CUNHA

37 | Application of micro-CT in evaluation of early diagenetic changes of the animal bone

Adrianna M. LACEL, Magdalena TOMANIK, Celina PEZOWICZ, Zofia SPIAK

38 | The protocol for the preparation of burned identified skeletons of the CEI/XXI collection*

Calil MAKHOUL, João COELHO, Márcia GOUVEIA, Inês SANTOS, Ana VASSALO, Maria Teresa FERREIRA, Eugénia CUNHA, David GONÇALVES

39 | Sex estimation based on clavicle and sacrum in the Portuguese population*

Joana PINTO, Joana FERNANDES, Maria Teresa FERREIRA, Eugénia CUNHA

40 | Study of bone preservation in the 21st century Identified Skeletal Collection*

Débora PINTO, Susana MOUTELA, Maria Teresa FERREIRA, Eugénia CUNHA

41 | The value of bone pathology in the identification process in Forensic Anthropology: Osteoporosis, cases studies from the Parish Cemetery of Penco

Camila Escobar SUAZO, Vanessa Saldías VERGARA, Ricardo GOMES

42 | Warping in burned human skeletal remains: assessing the influence of bone collagen through vibrational spectroscopy*

Ana VASSALO, Eugénia CUNHA, Luís BATISTA DE CARVALHO, David GONÇALVES

[*Running for the award for best poster communication]

ABSTRACTS

The phylogenetic position of *Homo antecessor* in the Eurasian Human Evolution: a review eighteen years later

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It is eighteen years since the human fossils recovered from the TD6-2 level of the Gran Dolina cave site, in Sierra de Atapuerca (Burgos, northern Spain) were assigned to a new hominin species, *Homo antecessor* (Bermúdez de Castro *et al.*, 1997). In this presentation I summarize the main results obtained from different studies of the TD6-2 hominin hypodigm during this period. At present, we can argue that this species is defined by a unique mosaic of primitive traits for the Homo clade, a certain number of derived features present in modern humans, a significant suite of derived features shared with Neanderthals and their ancestors in the European Middle Pleistocene (in particular with the Atapuerca-Sima de los Huesos hominins), and some derived features shared with the Chinese Middle Pleistocene hominins. I present an evolutionary scenario for interpreting these results. I suggest that a speciation event could have occurred in Africa/Western Eurasia, originating a new Homo clade. *Homo antecessor*, most probably dated to the MIS 21, could be a side branch of this clade placed at the westernmost region of the Eurasian continent.

The modular nature of the Neanderthal thorax: the *status quo*

Daniel GARCÍA-MARTÍNEZ^{1,2*}, Markus BASTIR¹

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Studies about the Neanderthal's thorax have speculated about different morphological patterns at different thoracic levels. Specifically, some authors, employing traditional measurements of the ribs, proposed an expansion of the medium thorax while others suggested, throughout the anatomical reconstruction of the fossil remains, that this expansion was produced at the lower thorax. This controversy is provoked in part due the lack of agreement between techniques and the lack of 3D quantification methods. To solve this question, we present the results of two recent papers about the Neanderthal thorax utilizing 3D methods, which could help us clarifying questions about different patterns at different levels. García-Martínez *et al.* (2014) studied the thorax size of Kebara 2 (60 kya, Israel) and found that the ribs were smaller at the upper part and larger at the lower part compared to modern humans. Both differences were statistically significant. Bastir *et al.* (2015) studied the first ribs' sample from the El Sidrón site (49 kya, Spain), finding that these ribs were more anterior-posteriorly projected than in modern humans, fact that is correlated to an anterior-posterior projection of the upper thorax and a medio-lateral expansion of the lower thorax. Considering that recent research supports a modular nature of the upper and lower units of the human ribcage, (Bastir *et al.*, 2013), this modularity accounts for different morphologies at different levels. Concluding, these 3D results' support an expansion of the lower Neanderthal ribcage relative to the upper as proposed in the anatomical composite of Sawyer and Maley (2005), fact that is supported by the modular nature of the ribcage.

Key words: *Homo neanderthalensis*, rib cage, modularity, sliding semilandmarks, geometrics morphometrics

References:

- Bastir, M.; Martínez, D. G.; Recheis, W.; Barash, A.; Coquerelle, M.; Rios, L.; Peña-Melián, A.; García-Río, F.; O'Higgins, P. 2013. Differential growth and development of the upper and lower human thorax. *PLoS one*, 8(9): e75128.
- Martínez, D. G.; Barash, A.; Recheis, W.; Utrilla, C.; Torress-Sánchez, I.; García-Río, F.; Bastir, M. 2014. On the chest size of Kebara 2. *Journal of human evolution*, 70: 69-72.
- Sawyer, G. J.; Maley, B. 2005. Neanderthal reconstructed. *The Anatomical Record Part B: The New Anatomist*, 283B (1): 23-31.

The biting performance of *Homo heidelbergensis* vs *Homo sapiens*

Ricardo GODINHO^{1,2*}, Laura FITTON¹, Paul O'HIGGINS¹

1 - Department of Archaeology and Hull York Medical School; University of York, UK

2 - Research Centre for Anthropology and Health (CIAS), Department of Life Sciences, University of Coimbra, Portugal

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Modern humans have been said to generate lower bite forces, and to be less efficient in resisting resulting craniofacial stresses and strains than other hominin species. This interpretation is based on the reduction of the face and of the masticatory muscles (as assessed by bony proxies) which modern humans underwent. However, recent quantitative research shows that *Homo sapiens* is relatively more efficient at generating bite forces than other hominin species such as *Homo neanderthalensis*. Despite this shift, it is still generally agreed that *Homo sapiens* is less able to resist masticatory strains due to a short face, a coronally orientated sub-nasal region and a canine fossa. Because bone is load sensitive and adapts to mechanical loadings, assessment of these biomechanical variables is of particular value. Existing research has not yet compared *Homo sapiens* to its proposed ancestral species, *Homo heidelbergensis*. In the present study we aim to compare these species in (1) their ability to generate bite forces, and (2) their ability to resist the strains generated during simulated masticatory function. These are approached using a Virtual Anthropology toolkit that combines virtual reconstruction, Finite Element Analysis (FEA) and Geometric Morphometrics (GM) to open up new approaches to the study of form and function. While modern imaging technologies such as CT allow us to capture 3D skeletal anatomy and imaging tools allow us to reconstruct virtual models, FEA allows virtual simulation of masticatory function, calculation of bite forces and resulting stresses and strains while considering the complex geometry of the cranium. GM quantifies form and allows assessment of the degrees and modes of deformation undergone by the crania submitted to FEA.

Key words: Human Evolution, Virtual Anthropology, hominin cranial form and function

The origin of *Homo* ca. 2.8 Ma in the Ledi Geraru research area (Afar, Ethiopia)

Ignacio LAZAGABASTER^{1,2*}, Ellis LOCKE^{1,2}, Irene SMAIL^{1,2}, John ROWAN^{1,2}, Dominique GARELLO⁴, Chalachew SEYOUM^{1,2,5}, Joshua ROBINSON^{1,2}, Eric SCOTT³, David FEARY⁴, Christopher CAMPISANO^{1,2}, Brian VILMOARE^{6,7,8}, William KIMBEL^{1,2}, Erin DIMAGGIO⁹, Guillaume DUPONT-NIVET¹⁰, Alan DEINO¹¹, Faysal BIBI¹², Margaret LEWIS¹³, Antoine SOURON¹⁴, Lars WERDELIN¹⁵, David BRAUN⁷, Ramon ARROWSMITH⁴, Kaye REED^{1,2}

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- 4 - School of Earth and Space Exploration, Arizona State University, USA
- 5 - Authority for Research and Conservation of Cultural Heritage, Ethiopia
- 6 - Department of Anthropology, University of Nevada, USA
- 7 - CASHP, George Washington University, USA
- 8 - Department of Anthropology, University College London, UK
- 9 - Department of Geosciences, Pennsylvania State University, USA
- 10 - CNRS Géosciences Rennes, Campus de Beaulieu, France
- 11 - Berkeley Geochronology Center, USA
- 12 - Leibniz Institute for Evolution and Biodiversity Science, Germany
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The Ledi-Geraru research area forms part the Lower Awash Valley (Afar, Ethiopia), a region with abundant sedimentary deposits which have yielded some of the most emblematic hominin fossil discoveries in the history of paleoanthropology. Ledi-Geraru is localized north of Hadar and Dikika, and west of Gona. A series of surveys carried out since 2002 have uncovered fossil-bearing sediments within the Lee Adayta region, which include at least four fault-bounded blocks: the Bulinan, the Gurumaha, the Lee Adayta and the Garselu. Abundant fossil vertebrate fauna have been recovered sampling a previously poorly known period between 2.84 to 2.58 Ma and which includes the earliest fossil attributed to the genus *Homo* ca. 2.8 Ma. The specimen LD 350-1 is a left hemi-mandible with P4 through M3 that was recovered from the Gurumaha fault block in 2013, which presents both primitive and derived characteristics attributable to the genus *Homo*. The vertebrate fauna associated with the mandible are typical of open grasslands but also indicate the presence of lakes and rivers. Some mammalian taxa have not been previously recorded in the lower Awash valley and show evidence of a species turnover that may be associated with climatic and environmental changes in the region. The 2015 field survey uncovered remains of at least three more hominin individuals and more fauna adjacent to the LD 350-1 site, reinforcing the potential of the Ledi-Geraru research area in answering key questions related to human evolution.

Key words: Human origins, Late Pliocene, mandible, jaw, East Africa

Human Evolution teaching within a context of non-formal education: a course for high school students

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Between October and December 2014, an advanced course in Human Evolution was held at the Instituto de Educação e Cidadania (IEC), located at Mamarrosa (Oliveira do Bairro, Portugal). IEC is a non-formal education institution devoted to engage students in science, which has built up a network bringing together schools and universities. This course was attended by 14 students (12 high school students and two teachers), and was given by eight university professors and researchers. Based on a workload of three hours per week, the course was carried out during ten weeks. Through these ten sessions, students attended lectures on subjects of Human Evolution, such as Evolutionary Biology, Primatology, Biological Anthropology, Paleoanthropology, Primate Archaeology and Prehistoric Archaeology. At the beginning and the end of the course, the students answered a multiple choice test composed by ten questions, each one related with one of the ten sessions. Initially, the students answered correctly to 42.7% of the questions, whereas in the end of the course, 62.7% of the questions were correctly answered. These results show that the course had a significant impact in the students' knowledge concerning Human Evolution. Moreover, at the end of the course, all students visited the Department of Life Sciences of the University of Coimbra. In these facilities, they had a hands-on opportunity to explore some of the materials, over which they had heard in the classes. We suggest that further investment in non-formal educational programs is necessary and a successful tool to engage students in Human Evolution topics.

Key words: Evolutionary Biology, Paleoanthropology, Archaeology, Instituto de Educação e Cidadania (IEC), advanced course

**The environmental context of early *Homo* at Ledi-Geraru (Afar, Ethiopia)
ca. 2.8 Ma: an assessment of the faunal community**

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Fossil and hominin-bearing sediments in the Ledi-Geraru research area of Afar, Ethiopia, have yielded the earliest record of the genus *Homo* - 2.8 Ma. The vertebrate fossils found in the Lee Adoyta basin are important because they fill a poorly-known time period in eastern Africa, where few fossiliferous deposits are found between 2.84 to 2.58 Ma. A total of 1481 specimens have been recovered, with at least 29 genera of mammals represented. Approximately, one-third of the mammalian taxa in the Lee Adoyta are shared with those in the youngest Hadar Formation (~ 3 Ma), whereas one-third are new to the Afar region. Ecological community structure analysis based on mammalian fauna suggests a turnover to more open habitat (mostly mixed grasslands/shrublands with gallery forest) that probably experienced less rainfall than any of those reconstructed for the Hadar Formation. The landscape was similar to modern African open grasslands, given the abundance of grazing species and lack of arboreal taxa. The existence of *Kobus sigmoidalis*, hippopotamids, crocodiles, and fish also reflect the presence of rivers and/or lakes. We conclude that the earliest evidence of the genus *Homo* is associated with an open environment; however, other sites in eastern Africa shortly after 3 Ma do not show a uniform transition toward open habitats. The Lee Adoyta basin may be sampling part of a local environmental signal and more evidence is needed to confirm if the origin of the genus *Homo* is related with the general opening of the environments in East Africa during the Pleistocene.

Key words: Human Evolution, Late Pliocene, Hadar, faunal turnover, climate change

Long-term balancing selection in the great apes

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Balancing selection maintains advantageous genetic and phenotypic diversity in populations. When selection acts for long evolutionary periods selected polymorphisms may survive species splits and segregate in present-day populations of different species. Here, we investigate the role of long-term balancing selection in the evolution of protein-coding sequences in the Homo-Pan clade. We sequenced the exome of 20 humans, 20 chimpanzees, and 20 bonobos and detected eight coding trans-species polymorphisms (trSNPs) that are shared among the three species and have segregated for approximately 14 My of independent evolution. Although the majority of these trSNPs were found in three genes of the major histocompatibility locus cluster, we also uncovered one coding trSNP (rs12088790) in the gene LAD1. All these trSNPs show clustering of sequences by allele rather than by species and also exhibit other signatures of long-term balancing selection, such as segregating at intermediate frequency and lying in a locus with high genetic diversity. Here, we focus on the trSNP in LAD1, a gene that encodes for Ladinin-1, a collagenous anchoring filament protein of basement membrane that is responsible for maintaining cohesion at the dermal-epidermal junction; the gene is also an autoantigen responsible for linear IgA disease. This trSNP results in a missense change (Leucine257Proline) and, besides altering the protein sequence, is associated with changes in gene expression of LAD1.

Association study of VNTR polymorphisms in 5-HTT (SLC6A4) gene with obesity risk in students from the University of Coimbra

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Some studies report association of the serotonin transporter gene 5-HTT with obesity, although results are still controversial. In this study, we tested the association between two 5-HTT VNTR polymorphisms (5-HTTLPR in the promoter region and STin2 in the second intron) with overweight/obesity in a sample of Portuguese young adults. Buccal swabs of 545 individuals (231 males, 314 females) aged 17-42 years (mean age 21 years) were subjected to DNA extraction and PCR followed by agarose or polyacrylamide gel electrophoresis for genotyping. Two groups of individuals were classified based on ranges defined by WHO: normal weight (BMI <25 kg/m²) (N=430), overweight/obesity (BMI ≥25 kg/m²) (N=115). The association of the polymorphisms with obesity was assessed by logistic regression and by Chi Square (x²) test for haplotypes, using the PLINK software, v.1.07. Marginal associations for the HTTLPR major L-allele (OR=1.29; P=0.09) and for the VNTR minor 10-allele (OR=1.32; P=0.06) were found with overweight (including obesity). Haplotype analysis revealed significant association for haplotype L10 (x²=4.2; p=0.04). A stratified analysis based on sport practicing showed a significant association with overweight/obesity in inactive individuals for 5-HTTLPR L-allele (OR=1.58; P=0.01) and the STin2 10-allele (OR=1.47; P=0.03), but not in a group reporting sport practicing (P>0.05). The group not-practicing sport showed haplotypes L10 associated with risk of obesity (x²=5.1; P=0.02) and S12 as a protective haplotype (x²=7.4; P=0.006). In conclusion, we found evidences for the association between the 5-HTT gene with overweight (including obesity) and that physical inactivity accentuates the influence of 5-HTT variants on obesity risk.

Key words: 5-HTT polymorphisms, overweight and obesity, Portuguese young adults

The human maternal ancestry of the Indian Subcontinent

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One of the probable major corridors of anatomically modern humans' dispersal after the Out-of-Africa migration was across South Asian coastline in India. South Asian mitochondrial DNA (mtDNA) diversity consists largely on basal autochthonous lineages of macro-haplogroups M, N (and R), which are virtually absent in the surroundings (Europe and East Asia). However, it is still uncertain how the colonization of the Indian subcontinent occurred. We obtained a refined phylogeny of the Indian mtDNA diversity (including samples from the 1000 Genomes Project and the Human Genome Diversity Project) from South Asia and neighbouring regions. Phylogenetic reconstruction was performed using parsimony and maximum likelihood (ML). Bayesian inference was applied to assess variation in the effective population size (N_e). The ML age estimate for haplogroup N in South Asia is 69.9 thousand years (ka) [61.5-78.3], ~16 ka older than the estimates for haplogroup M, which not only seems to be more recent in the region, but also to have an eastern origin, as previously reported. Moreover, the BSPs for different M clades show N_e increments in South Asia only in the last 25 ka, in opposition to population data, that peaks at ~35-40 ka. There might be no trace from haplogroup M involvement in the first settlement of South Asia and we detect, instead, a possible reexpansion from the East. Another important layer of Indian diversity corresponds to the influx of several N lineages from the Near East ~10 ka, probably related with agricultural expansions to South Asia.

Key words: mtDNA, haplogroups, colonization, Out-of-Africa

Investigating the maternal demographic history of an ancient human population in Southwest Turkey*

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More than two decades of research in the archaeological site of Sagalassos (southwest Turkey) resulted in the study of an ancient urban settlement in all its features. Founded in the 5th century BCE, the city of Sagalassos and its surrounding region experienced the domination and influence of several empires and civilizations, until it was eventually abandoned in the 13th century CE. Seismic activity and the Justinian plague may also have largely affected the inhabitants of this region, during the 6th and 7th centuries CE. To address questions related to demographic changes inferred by the extensive archaeological survey, we have contrasted the mitochondrial DNA variation of two ancient samples from Sagalassos (Roman and Byzantine) and a modern sample from the nearby village of Ağlasun. We explicitly tested different demographic scenarios using coalescence-based simulations together with an Approximate Bayesian Computation (ABC) approach. Our analyses revealed genetic continuity across two millennia in the region and indicated that a major population decline in the area coincided with the final abandonment of the city of Sagalassos, rather than with the plague or the earthquake.

Key words: Sagalassos, ancient DNA, computer simulations, ABC

* **Note:** Preliminary results of this work were previously presented at the Royal Society satellite meeting “Ancient DNA: applications in human evolutionary history” in December 2013.

Identification of subclades within Y-chromosome haplogroup J in the Portuguese population

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Y-chromosome haplogroup J-M304 reaches frequencies of about 10% in the Portuguese population, with its two main subclades, J1-M267 and J2-M172, presenting heterogeneous frequencies of about 7% and 3%, respectively. Until now, subhaplogroup diversity within J1-M267 or J2-M172 clades has not been assessed in the Portuguese population. This study aimed to identify and characterize the major subclades within J-M304 samples of Portuguese ancestry. Buccal swabs from 487 adult males were collected from different regions of Portugal and subjected to DNA extraction after informed consent. DNA samples were analyzed by standard PCR-RFLP and Sanger sequencing to determine J-M304 haplogroup and its most common subclades. Biallelic markers were hierarchically genotyped following the ISOGG 2015 haplogroup classification. Haplogroup J-M340 was identified in 11.5% of the studied population sample. Subhaplogroups J1-M267 and J2-M17 achieved heterogeneous frequencies of 3.3% and 7.2%, respectively. Within J1-M267 chromosomes, four distinct subclades were identified: J1a1-M365 (6.3%), J1a2b-P58 (68.8%), J1a2-L136 (xJ1a2a; J1a2b) (6.3%) and J1*-M267 (18.8%). In regards to the J2-M172 chromosomes, three subclades were identified: J2a*-M410 (72.9%), J2a2-L581 (2.7%) and J2b2-M241 (24.3%). The analysis of eight informative Y-STR loci revealed 11 and 30 different haplotypes within J1-M267 and J2-M172, respectively. The comparative haplogroup and haplotype analysis between different populations reflects the main contributions from Middle Eastern groups, including Sephardic Jewish, to the J-M304 subhaplogroups observed in the general Portuguese population. The European J1a-M365 subclade was observed to be different from that reported in individuals of Arab ancestry. No evidences of North Africa Arabian lineages were found in J-M340 Portuguese chromosomes.

Key words: Y-chromosome, haplogroups J-M304, J1-M267 and J2-M172, haplotypes, Portugal

Association of the lactase -13910C>T polymorphism (rs4988235) with BMI and fat-mass in a sample of students from the University of Coimbra, Portugal

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In most mammals, the ability to digest lactose present in milk decreases after the weaning phase. In contrast, in many humans, the main enzyme used to digest lactose continues to be expressed in adults, a phenotype known as lactase-persistence. The SNP -13910C/T (rs4988235), located upstream from the lactase gene (LCT), was shown to be associated with lactase activity in European populations. This study aimed to replicate previously reported associations of the LCT rs4988235 polymorphism with obesity-related variables in a Portuguese population sample. We studied 343 young adults (160 males, 183 females) aged 17-36 years (mean age 21 years) from central region of Portugal, students at the University of Coimbra. Anthropometric variables (weight, height, %FAT) were measured using standardized procedures. Genomic DNA was extracted from buccal swabs and rs4988235 was genotyped using TaqMan[®] probes. Frequency of genotypes was 35.3% CC (lactase non-persistent), 46.4% CT, and 18.4% TT. Genotype frequencies were consistent with Hardy-Weinberg equilibrium ($P=0.44$). Assuming a full dominance model for the minor T-allele and using linear regression models, statistically significant associations were observed for rs4988235 T-allele with BMI ($\beta=0.93$; $P=0.02$) and fat-mass ($\beta=1.42$; $P=0.009$), after adjustment for age and sex. CC individuals had lower BMI (22.58 vs. 23.43 kg/m²) and lower fat percentage (21.26% vs. 23.07%) than T-carriers (CT/TT). No significant association was found between rs4988235 and overweight (including obesity) by comparing CC vs. CT/TT genotypes ($P=0.137$). In conclusion, LCT polymorphism -13910C/T revealed association with the anthropometric variables BMI and fat-mass. However, previously observed associations with obesity were not confirmed in the Portuguese sample of young adults.

Key words: LCT variant -13910C>T, BMI and body-fat, overweight and obesity, Portuguese young adults

Comparative study of genetic and anthropological methods for the determination of the sexual gender in a Medieval collection of skeletonized individuals

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Sexual diagnosis of skeletonized bodies, whether in archaeological or forensic contexts is one of the primordial information to be achieved. By genetic influences during the skeleton development, bones adopt gender specific characteristics after adolescence. So, based on anthropological methods, is possible to determine the individuals' gender with high reliability. However sexual dimorphism is only clearer in the pelvis and skull. On the other hand, genetic methods are able to achieve the individuals' gender from any bone since it is based on the amplification of the homologous amelogenin gene, which exhibits different sizes between X and Y chromosomes. In the present study, 50 skeletons belonging to the Mértola archeological field' osteological collection, inhumated between the XIV and the XVI century, were studied. The sexual diagnosis, using anthropological methods, was performed at Department of Life Science, from the University of Coimbra. The study of the gender was performed with genetic methods at Forensic Genetics Service of Instituto Nacional de Medicina Legal e Ciências Forenses, and results were compared with the anthropological data. Among the 50 studied skeletons, the sexual gender was achieved only by anthropological methods in 21 cases (42 %). With genetic tools wasn't possible to obtain conclusive results on those 21 cases. In 24 cases (48%) was possible to get results from both methods, however, from those, only in 11 cases (46%) the results from anthropological and genetic methods match. In 3 of the 50 studied skeletons (6%) anthropological methods weren't able to obtain conclusive results. Only genetic methods achieve sexual gender of those 3 individuals. Only in 2 cases (4%) the sexual gender wasn't possible to achieve with any of the two methods. The results suggest that the alliance between genetic and anthropological methods can be a strong contributor for the correct gender identification of skeletonised individuals.

Key words: sexual diagnosis, amelogenin, ancient DNA, Anthropology

A study of 5-HTT (SLC6A4) gene polymorphisms and antisocial behaviour in a population sample of young Portuguese adults

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This study aimed to investigate the association between two promoter 5-HTT polymorphisms (ins/del 5HTTLPR and SNP rs25531 A>G) and antisocial behaviour in a Portuguese sample of young adults. A sample of 202 individuals (102 males; 100 females), aged 18-37 years, were enrolled in the study. A questionnaire assessing a variety of problematic behaviours was constructed based on a previously reported delinquency scale. A mean score value to measure aggressive behaviour was determined for each individual. DNA was extracted from buccal cells collected with written informed consent. Genotyping was performed by PCR followed by agarose gel electrophoresis for 5-HTTLPR and PCR-RFLP using *MspI* for rs25531, as described elsewhere. Mann-Whitney test was used to compare the score distribution between sexes and rs25531 genotypes. The Kruskal-Wallis test was used to analyse the score distribution between HTTLPR genotypes and haplotype classes. Significant differences for the score distribution of self-reported aggressive behaviour were found between sexes: 0.326 in males vs. 0.100 in females ($P < 0.001$). The score distributions between genotypes showed no significant differences for 5-HTTLPR, rs25531 and respective haplotypes, nor in the total sample neither within sexes ($P > 0.05$). Nevertheless, it was observed, mainly in males, a tendency towards greater scores of aggression in the 5HTTLPR S-allele carriers (mean scores LL 0.29; LS 0.32; SS 0.39), rs25531 G-allele carriers (mean scores AA 0.31; AG 0.38) and haplotype LG and S classes (mean scores L'L' 0.28; L'S' 0.31; S'S' 0.39), favouring the previous studies that describe an association between the S allele of 5HTTLPR and aggressive behaviour.

Key words: 5-HTT polymorphisms, genotype, serotonin, aggressive behaviour

Metabolic disease in migrant populations of South Asian origin: competing explanations

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There is a high prevalence of type 2 diabetes and cardiovascular disease in people of South Asian origin living in affluent Western countries. A number of explanations for this finding have been offered, including genetic vulnerability, developmental origins, a high-fat diet and low levels of physical activity, and psychosocial stress. This paper examines the plausibility of these various explanations, with a particular emphasis on the possible role of physical activity. In doing so, it draws attention to problematic assumptions that have been made in relation to genetic underpinnings of ethnic differences in health, and about the process of 'acculturation'. As population mobility increases worldwide, an increased understanding of the processes that may underlie health problems in migrant groups (e.g. from Mexico to the United States) will have a wider application.

Poverty, health and health inequalities

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Social and economic development of the last century led to major improvements on quality of life and health. Health improved, life expectancy increased. However, this cycle of prosperity ended up in a new economic and social order - "the crisis". Unemployment, lower wages and poverty are markers of this new order which has placed to the most affected countries a future dominated by vulnerability and uncertainty. Portugal is one of those countries and the Portuguese have experienced a deep deterioration of their living conditions, with expectable consequences on health. This is a study about health and its socioeconomic inequalities in the decade 2001-2011 in the Lisbon Metropolitan Area (LMA). Using standardized premature mortality ratios and an index of socioeconomic deprivation, we tried to clarify the most recent trends in poverty, in health and in the social gradient of health. Our findings show an increase of almost 40% in the population living in extreme deprivation conditions, as well as a degradation in health. Also emphasize the positive association between deprivation and poor health, highlighting the social gradient in health that, however, weakened in the decade. Health becomes worse among the high and middle social classes, but not in the bottom of social hierarchy. We concluded that health degradation in the LMA is selective, affecting only the highest social classes. Therefore, health iniquities tend to decrease but without health gains. On the contrary, there is a greater tendency to level health "down", at the cost of the health loss of the most affluent groups.

Key words: deprivation, premature mortality, health inequalities, LMA

“In the between” or a particular portrayal of (a) human life

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Life, death and in between is the meeting main idea. Our proposal is radically concerned with the life time “in the between”. As we are researchers in psychology our focus is on human development, human learning or more accurately, on human relationships. We would like to discuss some worries about human relational patterns that give place to abandonment, unhappiness, unfulfilled life projects, and, at the same time utopia. Critical perspectives in psychology can highlight problems and bring insights in order to prevent/solve human misconceptions. Based on two investigation settings with institutionalized children (victims of parents neglect or incapacity to take proper care of them) and adult educators (on each institution), we discuss some arguments that usually arise in order to define or justify oblivion. Investigations were conceptualized according to *Grounded Theory* methodologies - 16 adults were interviewed and 28 children (aged from 0 - 12 years old) and 6 adolescents (14 - 17 years old) were observed during 8 months (from September 2014 until April 2015). The core of our presentation is a proposal on critical thinking in psychology: Discussing Heidegger (we are beings for death) and Epicuro (while we are living death does not exist) with the lens of Simone Weil’s mindset, we do not assume neither a psychopathological point of view nor a lack of animal instinct leaning harmful relationships. What we are trying to discuss is a matter of behavior rooted in *status quo* (culture, religion, politics, or a kind of ubiquitous influence that people assume as theirs without pondering) that frequently blames the victim. We will focus on Marcuse’s idea about blocked opportunities for human emancipation as common within this population. We also highlight George Mead’s perspective on symbolic interaction as central while dealing with these particularly vulnerable human beings. What can we do in order to promote human relationships and human development is the result of those two investigations and the objective of this presentation. Central ideas as those assumed as universal human rights are taken into account and scrutinized on our conclusions.

Key words: human development, critical psychology, children, family, culture

Nutritional status of the Riverine population of the Caxiuanã National Forest, Melgaço-Pará, Brazil

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The “riverine” in the Brazilian Amazon are non indigenous, peasant populations, with intense miscegenation among white settlers, the indigenous native population and the enslaved black African. They are small producers, with specific life manners who depend and deeply know the nature and its cycles and use relatively simple technology. Like other invisible and vulnerable populations in the Amazon, their general living conditions have been poorly studied. This study analyzed the weight status of a representative sample of the population of Caxiuanã National Forest, Melgaço-PA, Brazil and its surroundings. 360 people (171 men, 189 women; 75 0-5 year old children - 39 girls, 36 boys; 66 5-10 year old children - 41 girls, 25 boys) were analyzed based on the WHO parameters (weight/height, height/age, weight/age, BMI/age, weight, height, waist circumference, BMI). 44% of 0-5 year old children were below -2, and 12,12% of 5-10 year old children fell below -3 Z-score indicating an energy loss process, possibly due to a durable food shortage state, especially the girls. Youth, adults and seniors were considered standard, with only a small variation up on waist circumference of older women. Malnutrition in children is common in Amazon rural population in contrast to adults. Children with low weight status due to malnutrition are more likely to become overweight adults in the future. Therefore, it is urgent to develop public health programs in order to give greater attention to the situation of children of current rural Amazonian populations so that future problems such as obesity and hypertension are minimized.

Key words: Amazon population, malnutrition, WHO parameters, Z-scores, children

Daytime sleepiness and caffeine intake in Portuguese University studentsMaria-Raquel SILVA^{1,2,3*}, Teresa PAIVA^{3,4}

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Caffeine is one of the most consumed psychoactive substances in the world, in particular for young adults and, therefore, it can alter, for example, their sleep pattern. The main purpose of this study was to evaluate daytime sleepiness, sleep quality, sleep duration and caffeine consumption among Portuguese university students. This study included 152 individuals (23.9 ± 3.7 years old; 67 males and 85 females). A questionnaire of self-administration was applied to collect the following data: socio-demographic, clinical, food habits, sleep and physical exercise. The evaluation of eating habits included weekly and daily habits of consumption of different sources of caffeine (tea, energy drinks, soft drinks, chocolate and coffee). Sleep was assessed using the Epworth Sleepiness Scale and Pittsburgh Sleep Quality Index. This study was approved by the Ethical Committee of the University Fernando Pessoa and written informed consent was obtained from all participants. We conducted a descriptive analysis and linear regression of the data using the SPSS software, version 22.0 for Windows. The level of significance was 5%. Results showed that 51% of subjects had a good sleep quality and 64% had mild daytime sleepiness. Most participants (72%) consumed coffee at least twice a day. There was a significant decrease in daytime sleepiness with the consumption of coffee, chocolate and energy drinks ($p < 0.05$). None of the studied sources of caffeine influenced participants' sleep quality ($p > 0.05$). Daytime sleepiness was negatively affected by caffeine intakes, namely coffee, chocolate and energy drinks. Caffeine is known to be a stimulant of the central nervous system, thus, its consumption, may affect the duration and the quality of sleep with negative consequences for students' daily lives and health. Educational campaigns should be implemented in order to improve students' sleep habits.

Key words: sleep duration, sleep quality, coffee, chocolate, health

**If you fear death, anxiety will haunt your life - so, let a story cherish your
dreams**

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Children are guardians of new stories of an all-new Possible Human History. But children are humans in development, they ask for support, freedom, knowledge, dignity, and the possibility to act comprehending life itself: how it begins and how (why) it has an end. With our presentation based on a qualitative investigation on children literature we aim to, (1) understand childhood in the history of humankind; (2) understand how are children taken into account on XXI scentury's first years on developed (and free from war) countries; (3) assume development theories in Psychology as fundamental tools to support the value of childhood; (4) discuss how literature for children is being used in order to uphold dignity, or freedom, or the environment, or animal's respect, or life, or death. Having Critical Theories in mind we'll discuss the last tabu that remains and keeps families refrain from their children to grow: fear of death, the fear of our own finiteness. But also having in mind the seminal paper of Judith P. Moss (1972, p.530) "Dying has replaced reproduction as the hush-hush topic between parents and children, and to a large extent in modern literature for children." we assume this must be discussed and changed. In order to fullfil our goals we will (1) review state of the art on childhood theory; (2) bring the example of 4 "books for children" written or translated into Portuguese (part of the content analysis of classical and up-to-date books that we are studying); (3) show how important it is to help children grow in a trustful environment in order to expect them to become ethical citizens; in order to expect them to step in and be able to fight for justice, fight for true Humanity in humans' life.

Key words: childhood theory, books for children, culture, psychological development, critical theory

Changes in television viewing, computer use and walk to school among elementary school-aged children in Portugal from 2002 to 2009

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To describe changes from 2002 to 2009 in television time, computer use and walk to school in Portuguese schoolchildren, aged 7-9 years old. A cross-sectional study was carried out in 2002 and 4511 children, aged 7-9 years old, were observed. The same schools were visited again in 2009 and 8300 children were observed. In both surveys, a questionnaire was fill out be parents concerning family characteristics as well child's behaviors such as television time, computer use and way to school, walking or by car. Concerning television viewing time, in 2002 15.2% of children spent more than 2 hours and in 2009 was 27.5%; computer time changed from 0.6%, more than 2h in 2002, to 2.9% in 2009. In 2002 32.4% of the children walked to school and 52.6% use the care and in 2009 were 24.0% and 59.2% respectively. Portuguese children increased television time, computer use and decreased the percentage of children who walk to school. This changes in sedentary behaviors require attention doing their negative impact in child health status.

Key words: child health, behavior, television, computer, active travel

Social determinants of health and Sickle Cell Disease in Amazonia

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Sickle Cell Disease (SCD - *HB^sS*) is the most prevalent genetic syndrome of the world. In the Amazon, it is estimated the SCD affects 1% of the population, which faces challenges considering the Social Determinants of Health (SDH) such as limited access to health services, biosocial vulnerability, lack of knowledge about the SCD and skin color stigma at medical services. This study examined 40 SCD patients from the Belém Regional Hemocenter, investigating income/education, ethnic racial/institutional prejudice, SCD perceptions and its kinds of treatment, in order to understand how biology and culture interact on their daily routine. Ethnographic and qualitative research was used, based on participant observation and interviews conducted in the Hemocenter Regional (Blood Center/Belém), Brazil, to 40 people with SCD (05-49 years/age), representing 10% of the population affected in the State of Pará. 42% of the families have low income (approximately US\$45/person/month in 2012), 70% have only primary education, 96% depend exclusively on the public health services, and 57% suffered some type of racial/institutional prejudice. SCD is seen by these people as a "disease that comes from black people". In conclusion, the racialization of SCD is a SDH which hinders its diagnosis and treatment. As it involves biological and sociocultural aspects, SCD is a complex ailment, requiring specific public policies and better qualification of the health services to meet the needs of Amazonian communities.

Key words: genetic disease, institutional racism, black, Brazil

Discrete dental traits of a Portuguese population, from Montijo (Portugal)Soraia BATISTA^{1*}, Fátima ALMEIDA¹

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Humans and other primates have four types of teeth. Each type is represented in both the upper and lower jaws, albeit with their own morphology. Discrete traits were used in the search of biological relationships between populations from the 19th century onwards. The goal of this work is to study the discrete traits of 497 teeth, in order to characterize a Christian Medieval/ Modern Portuguese sample from Montijo. A total of 17 discrete traits were selected for this analysis. The grade of expression grade was evaluated according to the ASU Dental Anthropology System. Once the sample consists mainly in loose teeth, the counting method used was tooth count. The sample is characterized more by the absence and low frequency of traits. The most frequent traits found in the sample were Y groove pattern on lower molars (M1 - 86.6%; M2 - 73.5%; M3 - 75.0%), four-cusped second lower molar (92.7%), two-rooted upper first premolar (28.6%). Among less frequent traits are Carabelli's cusp (M1 - 9.5%; M2 - 5.2%), shoveling (UI2 - 8.1%). The frequencies of the traits near the sample to Western Eurasians populations (high frequency of four-cusped lower molars, intermediate frequencies of two-rooted first upper premolar, low frequency of shoveling and absence of the majority of the traits analysed). Sub-Saharan Africa groups are also represented by the high frequency of Y groove pattern on the second lower molar. When compared with other samples of the Portuguese territory, are found some similarities. This work allows adding more information about dental morphological traits of the Portuguese population.

Key words: Biological Anthropology, Dental Anthropology, dental morphology, Montijo

Social stratification of aging and health: mortality pattern at Coimbra municipal cemetery between 1884 and 1910

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At the dawn of the XX century, the Portuguese society consisted of various social groups that were sharply differentiated by the level of their well-being, as a consequence of their socioeconomic condition and their access to food and shelter. Such differences may have influenced the aging and health status between those social groups and, therefore, their mortality pattern. The main goal of this study was to evaluate the longevity and health of a group of Coimbra inhabitants buried at the local cemetery between 1884 and 1910. A sample of 7083 deaths were recorded and grouped into 3 categories according to their professional activity: higher socioeconomic level, medium socioeconomic level and lower socioeconomic level. For each category, the cause and the age of death were analysed. In the period under screening, the majority of deaths were caused by infectious diseases. However, they were more pronounced in the lower socioeconomic level. They make up 66,4% of all deaths caused by tuberculosis; 65.8% of all deaths caused by pneumonia, and 90% of all deaths caused by gastroenteritis. The average age of death varied significantly between groups, with a variation range of 21 years. Historical documents suggest that the diet of farm workers and labours was dominated by carbohydrates and limited variety of genres. Protein consumption was very low, in particular those of animal origin, and fruit consumption was almost non-existent. We hypothesize that poor diet, hardness of the farm work, and the number of hours worked out daily contributed to the immunodeficiency of the lowest socioeconomic group, thus explaining the observed pattern of mortality.

Key words: nutritional status, causes of death, longevity

Suicide rates variation in mainland Portugal across the 20th century

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Suicide rates vary considerably between regions in mainland Portugal. In the last 30 years, the highest rates were registered in the South, at the regions of Alentejo and Algarve. The most frequent explanation for this uneven distribution, particularly in Alentejo, has been: i) the isolation of the aged population, as a consequence of human occupation patterns in small and dispersed households; ii) the family structure disaggregation resulting from labour migration, and iii) the lack of religious faith. The main goal of our study was to reveal spatial, temporal and demographic patterns which are important in the identification of social and cultural factors contributing to suicide. Both suicide mortality and population size data for both districts and municipalities were collected from National Statistics Institute (INE) annual publications, from 1890 to 2011. Within this period of time, the uneven suicide rates' distribution puts Beja (25-30 per 100 000) amongst the districts with the highest prevalence of this cause of death in the region of Alentejo, since the beginning of the 20th century. The assessment of differential prevalence values across municipality's revealed areas with different levels of risk.

Key words: suicide rates, Portuguese population, spatial patterns, temporal patterns

Gender differences in sports involvement: a case of children's self-stereotyped ideas

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Boys and girls still do not participate equally in the same sport activities and our purpose was to understand if this was due to self-stereotyped ideas. Self-reported answers and socio-demographic data were obtained in three schools at Coimbra, Portugal (N=443, 47.9% boys, aged 6-10 years old). Four questions (Q) deserved our careful consideration: "To do sport is more important for boys than girls?" (1), "Boys are better sportsman than girls?" (2), "There are sports exclusively for boys?" (3), and "There are sports exclusively for girls?" (4). We found that age is a strong factor when it comes to self-stereotyped ideas about sport participation, with older kids having a more open mind ($p=0.004$, $p=0.017$, $p<0.001$, and $p=0.002$ respectively). Girls tend to assume that both sexes have the same skill ($p<0.001$) and that sport is essential for both boys and girls ($p<0.001$). We found a statistical difference on "There are sports exclusively for boys" ($p=0.002$): 16.59% of the boys believe that some sports are restricted to their own gender. Parents' scholar degree did not influence kids' answers. These stereotypes, whether made consciously or unconsciously, are present in children since a young age. The gender differences can be due to socialization process, considering that we also found differences according to each child's school ($p=0.017$ and $p=0.005$ for Q1 and Q3). Interventions are needed, not only in order to raise females' confidence in their ability to practice sports but, more important, to change males' perception of sexes, particularly girls' value in sport activities.

Key words: children, physical activity, sex-role, stereotypical perceptions

The ketogenic diet: implications for athletes' health and performance

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Several studies have reported that athletes competing in aesthetic sports, such as gymnastics, ballet and synchronized swimming, or in weight-sports as judo, boxing or bodybuilding need to reduce rapidly their body weight before competition to achieve a desirable body composition for performance success. Low calorie diets just before competition are often used and normally impair athletes' health, energy availability, physiological function and body composition. Although these diets are frequently used, those very low in carbohydrates are becoming famous amongst the athletic population. The main purpose of this study is to understand the influence of very low carbohydrate ketogenic diet on athletes' health and athletic performance. We thus did a systematic review of the scientific literature. Twenty-nine scientific research papers published between 2000 and 2014 were obtained from the following databases: *Pubmed*, *Sciencedirect* and *SciELO*. From the articles analyzed it was demonstrated that this diet restricts carbohydrate intake below 30g/day, limiting glucose availability and stimulating ketogenesis in the liver. Thus, a physiological ketosis is induced to supply the heart and the central nervous system with a high energy metabolic substrate, the ketone bodies. Some studies have reported several advantages by the use of this diet, but only few have focused on athletes' body composition or their performance, and all have been applied for a short period of time. The general recommendation for athletes, who might be interested in this type of diet, such as athletes from aesthetic and weight-sports, is that it should be implemented for at least 15 days with an adequate planning and monitoring associated with frequent measurements of VO_2 max and blood lactate. However, it is important to note that given the equivocal understanding of the ketogenic diet side-effects, further research and consideration is required to obtain a greater knowledge of the interaction between the diet ketogenic and athletes' performance.

Key words: low carbohydrates, aesthetic sports, weight-sports

The evolutionary origins of Human Cognition: insights from research on chimpanzees

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In this talk, I compare cognitive development in humans with that of chimpanzees. Humans and chimpanzees are largely similar at early developmental stages, however, there remain several crucial differences. Chimpanzees have been very rarely observed to engage in general imitation and active teaching. Young chimpanzees possess exceptional working memory capacities often superior to those of human adults. In contrast, their ability to learn the meaning of symbols is relatively poor. Human infants are typically raised by more than one adult, not only the mother, but also the father, siblings, grandparents, and the other members of the community. The human infant is characterized by the stable supine posture of the neonate that enables face-to-face communication via facial expressions, vocal exchange, manual gestures, and object manipulation because both hands are free. The stable supine posture helps to make us human. The development of social cognition in humans may be integrally linked to this mother-infant relationship and the species-specific way of rearing the children. In sum, based on the parallel effort of the fieldwork and the laboratory work of chimpanzees, I present possible evolutionary and ontogenetic explanations for aspects of cognition that are uniquely human.

The diet of the chimpanzees at Caiquene-Cadique, Guinea-Bissau: from cashew to snails

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Human occupation of natural habitats and conversion to other land uses, such as agriculture, is increasing all around the globe. Non-human primates are often forced to live within these areas and to exploit these human-influenced habitats. Understanding how they adapt and cope with these ever-changing conditions is vital, and yet systematic data are lacking. Here, we examine the feeding ecology of an un-habituated community of western chimpanzees (*Pan troglodytes verus*), in the forest-savannah-mangrove-farm mosaic of Caiquene-Cadique, Cantanhez National Park, Guinea-Bissau. A combination of systematic data collection methods (faecal samples, feeding traces, direct observations) was employed during the 9-month field study. There was marked seasonal variation of wild plant food-availability, but the chimpanzees were able to maintain a ripe fruit based diet. Ten important food species were identified for this community, including oil-palm (*Elaeis guineensis*) fruit and flower. Apart from wild plant foods, agricultural crops were also regularly consumed, representing 13.6% of all plant species eaten. This community frequently consumed honey, but there was no confirmation that these chimpanzees included insects or vertebrates in their diet. Albeit, we found indirect evidence of the possible smashing and consumption of giant African snails (*Achatina* sp.). To date, human-chimpanzee ‘conflicts’ over access to space and resources appear uncommon in Caiquene-Cadique, but it is likely that they will become more frequent with time, crop-feeding being a potentially problematic behaviour. For any biodiversity conservation to work and improve human-wildlife coexistence, the needs of both will have to be fully understood and incorporated into locally-appropriate flexible strategies.

Key words: feeding ecology, *Pan troglodytes verus*, anthropogenic habitat, crop-feeding

**Dispersal in the Desert: genetic diversity and population structure of the
Guinea baboon (*Papio papio*) in Mauritania**

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Dispersal is an important evolutionary force impacting the species' spatial structure and global persistence. Dispersal strategies are frequently sex-biased in mammal species with polygamous or promiscuous mating systems. Although males usually disperse at higher rates than females, the reverse pattern has been identified before for several species including the Guinea baboon (*Papio papio*). Guinea baboons occupy a small distribution area in West Africa and have been mostly studied in Senegal and Guinea-Bissau. Molecular data point to female dispersal and male philopatry in Senegal and historical female-biased dispersal pattern over the entire range. However, intra-specific variation in the extent and direction of sex-biased dispersal was found in Guinea-Bissau, where gene flow was mediated through by both sexes. This study aims at investigating the dispersal strategies of Guinea baboons in Mauritania using non-invasive faecal samples and contributing for the conservation of these populations. In Mauritania, the populations are restricted to the southern mountains and, considering the large distance between suitable areas for baboons, it is expected some degree of isolation between the populations of the mountains and between these populations and the ones in the core area of the species' range. Preliminary results of population structure and genetic diversity from microsatellite and mtDNA data, obtained through analytical and statistical tests, indicate the possible existence of differentiation between the different populations in study.

Key words: male philopatry, population structure, intra-specific variation, primates

Is sexual dimorphism in cranial form associated with sexual dimorphism of masticatory function? An approach using finite elements analysis and geometric morphometrics on two papionin species*

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Sexual dimorphism in cranial form can be significant in papionin species. Yet, males and females tend to eat very similar diets. This raises the question of whether cranial functional performance during mastication is equivalent between the sexes when diets are not dimorphic but cranial form is. Here, the hypothesis that males and females of the same species perform similarly, despite differences in cranial form, is tested. Crania from one male and one female belonging to two closely related species of papionin monkeys, *Theropithecus gelada* and *Papio anubis*, were modelled using CT data. *T. gelada* is highly granivorous, while *P. anubis* has a more generalist diet. Finite elements analysis was used to assess mechanical performance in these crania during simulated biting along the dental row. The deformations of each cranium in each bite were assessed using landmark-based geometric morphometrics and the results scaled to the same bite force (100N). The results were plotted using principal component analysis. The male and female of each species show similar strain maps and large scale changes in size and shape with each bite. Differences between species are greater than differences between the sexes within the same species. The male and female *P. anubis* deform most similarly, albeit the female to a slightly lesser degree. Differences between male and female of *T. gelada* are a little more pronounced, but are mainly in degree rather than manner of deformation. In conclusion, a sexually dimorphic cranial form does not seem to be clearly associated with a sexually dimorphic masticatory function.

Key words: sexual dimorphism, cranial form, masticatory function, papionins, finite elements analysis, geometric morphometric

* This work was presented as a poster at the 3rd Annual Meeting of the European Society for the study of Human Evolution, Vienna, 20-21 September 2013.

Mother-infant behavior in wild Bornean orangutans in a great apes perspective

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Among all mammalian species orangutans have the longest inter-birth interval (IBI). IBI ranges between 8.25 and 9.25 years in Sumatran while in Borneo it stands between 6.1 and 7.7 years, longer than in any other species of apes, like chimpanzees (4-6 years) and gorillas (3-4 years). However, studies concluded that orangutans acquired competence in locomotion, food processing and nest building, and start ranging independently at the same age as terrestrial apes. The main aim of this study is to understand how ecological factors and hormonal status of the mother influence her behavior towards the offspring and when, during their development, Bornean orangutans acquire the skills/competence/independence to survive in their environment. The study site comprehends an area of approximately 2 km² (of total area of 438km²) in Danum Valley Conservation. The observations were conducted in 2013, from April to June and September to December, and, in 2014, from February to December. We collected data using a combination of continuous and instantaneous sampling. The data collected (currently under analysis) comprises activity budget both of the mother and offspring, and independent immature individuals, diet and food sharing behaviors, play behavior, mother-offspring proximity and contact, association and interaction with other individuals. The results will provide insight into Bornean orangutan development and the role of the mother during the process, and by comparing with existent data from other field sites, we will have a better understanding of how the ecological factors may link to potential differences between species or subspecies, and ultimately understand differences across other primate species.

Key words: infant development, independence, inter-birth interval, vertical transmission

Social behaviour in a captive chimpanzee (*Pan troglodytes*) group: gender and age roles

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The goal of this study is to describe social (affiliative, play and agonistic) behaviors and interactions in a chimpanzee colony considering age and gender. In particular we aim to study female interactions with the adult males and with young considering the high number of females in the group. 15 individuals (aging from 4 months to 20 years) composed the group: seven adults (two males and five females), one sub-adult female, three juvenile females and four infants. Quantitative data were collected using 15-min focal sampling method (300 min collected for each individuals). Results were analysed using non-parametric statistics tests. Affiliative and play (social and solitary) behaviours were similar in both sexes of adults individuals (Mann Whitney Test, $p > 0.05$); affiliative behaviours were more common in adults than in young or juveniles ($p < 0.01$), whereas play showed higher percentage in juveniles of both sexes than in adult chimpanzees ($p < 0.01$). Females dedicated more time in affiliative activities with infants and young than with adult individuals, including the two males ($p < 0.01$). Agonistic interactions were more frequent among adults though were rare; there were significant differences between sexes where males were more aggressive ($p < 0.01$). The rare agonistic behaviors performed by both sexes might be correlated to the high presence of females and to the already established and clear leadership of the group by one of the two adults males. In conclusions as observed in other works, the females spent more time moving and carrying infants, infants were mainly involved into social play activities and the adults mostly slept or ate, demonstrating that the social and environmental changes did not have a great influence on the colony.

Key words: Hominidae, captive colony, affiliative and agonistic behaviours, social roles

Basque “oral history” from a dental anthropological perspectiveRichard SCOTT^{1*}

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The Basque populations of southern France and northern Spain speak a language quite distinct from that of their Indo-European speaking neighbors. This uniqueness has long intrigued anthropologists. Where did the Basques come from? How long have they resided in the Pyrenees? Are they the last remaining vestige of Upper Paleolithic populations in Western Europe? Although geneticists have written dozens of papers on Basque blood groups and mtDNA/Y chromosome haplogroups, their dentition has received scarce attention. To remedy this deficit in our knowledge of Basque biology, observations were made on tooth crown and root morphology in living and skeletal samples to determine how Basques fit into the larger sphere of western Eurasians (Indo-Europeans, Afro-Asiatics, Caucasians). Although dental morphology provided the impetus for this study, additional data were obtained on tooth measurements from living, medieval, and post-medieval samples. For the skeletal series, temporal trends in oral health and indicators of dietary behavior were also assessed across the A.D. 1500 boundary. In the context of a traditional dental anthropological study, there were also surprises along the way. A broad overview of all facets of the Basque dentition provides a new and interesting spin on their ‘oral history.’

An experimental reconstruction of cremation rituals in the ancient Veneto area: preliminary results

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The cremation has a very ancient origin: the first evidence of this funerary ritual in Veneto region (Italy) comes from the Bronze Age, and then it became subsequently the predominant ritual amongst the ancient Veneti population in the Iron Age, as documented by the huge number of necropolis. However, it is still difficult to determine the methods with which this funerary practice occurred. The experimental archaeology aims to shed light on these issues, supported by the rare insights provided by written sources, the archaeological data and through the modern technologies of analysis. The author has carried out eight experimental funerary pyres with different dimensions and extinguishing methods (for example using water or wine), using pigs corpses, whole body or in parts, in an attempt to reconstruct these ancient rituals in the Veneto region, based on historical, archaeological, anthropological and paleo-botanical data. The cremation process was carefully monitored by recording the changes of temperature over time and their relationship with the changes observed on the bones (different colors, fractures, deformations and loss of weight). The results provided new information on the potential duration of the ancient cremation process and the construction of the funerary pyre, investigating the time, the amount of wood and the different types of wood needed to build a proper functional pyre. These experiments also bring attention to the possible use of wine to extinguish the burning pyre in the final phases of the cremation process in the ancient Bronze and Iron funeral rites, as reported by historical sources (Hom. Il. 23.218ss.; 24.1007ss), providing new data for their interpretation.

Key words: Ancient funeral rites, experimental archaeology, rituals with wine

Can a database with pathology be healthy for research? The inclusion of data considering paleopathological information in the bioarchaeology database

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The Endóvélco database, updated and maintained by the DGPC, is a relational database, composed by several “branches” of information pertaining to Portuguese archaeological heritage, sites and excavations. A new “branch” has been under development regarding bioarchaeological information from human remains exhumed from archaeological sites, which is currently being optimized to reflect recent advancements in both research and fieldwork, through the revision of some structural aspects and regarding the data to be inputted. The aim of this database is not only to constitute part of an inventory that will further enable the heritage management by the DGPC, but also to be used as a research tool for the scientific community that will allow, through online access, to search for osteological remains exhumed from archaeological sites and available for study, and thus serving as an efficient guiding tool to researchers and professionals. An improvement of the system will also be the online access to the anthropological reports, an ongoing project that, associated to this data, will empower the knowledge of past populations exhumed in Portugal, and potentiate the scientific value of archaeological osteological remains that have not been reburied. Of the several types of information being revised for inclusion/exclusion, this presentation will focus on paleopathological information, with the purpose of raising the debate over the advantages and disadvantages of including information of this nature and, if so, the way in which it should be included.

Key words: past populations, skeletonized remains, anthropological reports, search filters

**Funerary contexts: some ideas on the problem of children representation
and on evidence of family and affective ties in death**

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The funerary context of a burial should be interpreted as a part of a whole; only then we can better understand the organization of the cemetery from where the burial was exhumed. Nevertheless, this objective is often hampered by the small areas excavated. This paper aims to present and interpret some ideas related to burial practices and archaeological and anthropological excavations carried out in recent years in Portuguese funerary sites from Medieval, Modern and Contemporary periods. Besides several selective filters described in literature (biological, cultural, environmental or methodological), there is evidence of proper places for burying children in several Portuguese churchyards (e.g., in Évora de Alcobaça, Amieira do Tejo and Barcelos) which, depending on the area and location of the archaeological surveys, can skew even more the analysis of children's representation in a given cemetery and, consequently, in a natural population; on the other hand, there are some funerary details which can help us to understand if we are in the presence of some kind of family or emotional bonds in death when burying two people side by side. In this study, we present three cases of burials exhumed in the Freixo de Espada à Cinta church and in the Paço da Giela chapel (Arcos de Valdevez) which seem to indicate it. We hope our results can somehow help the interpretation of future excavations in Portuguese cemeteries of the same chronological period.

Key words: interpretation, funerary practices, selective filters, Portuguese Catholic burials

Dental Enamel Hypoplasia in a medieval Portuguese sample from Coimbra and its possible etiology

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The aim of this communication is to analyse the results of the study on dental enamel hypoplasia documented in 58 adult dentitions belonging to the São João de Almedina archaeological population who lived in an urban environment (Coimbra, Portugal) between the 12th and 16th centuries. The sample consists of 28 males, 20 females and 10 individuals of unknown sex - divided into three age classes (young adults, adults and older adults) - with at least one jaw present. Following the recommendations of Hillson (2001), all present teeth were seen under a strong direct light with the help of a magnifying glass. When a localized horizontal enamel depression was seen on the labial surface of the teeth it was classified as one of the three types of hypoplasia (groove, pit or plane). The location of each defect was also recorded: cervical, contact region or occlusal. Enamel hypoplasia was observed in 58.6% (n=34) individuals and 33% (n= 180) teeth. Grooves (31.4%, n=171) were the most common type, involving mostly the cervical crown. Canines and premolars were the mostly affected teeth. The groove defects occurred more frequently in the upper teeth (36.3%, n=73) than the lower teeth (28.5%, n=98), women (37.6%, n=58) and young adults (38.8%, n=45). Comparing with the data obtained by Cunha (1994), who has studied the same subjects, the central age tendency for the formation of hypoplasia was between 4 and 6.5 years (51.1%). One possible explanation, among others, for the peak on the formation of hypoplasia, at a population level, is the weaning stress and consequent introduction of new food in the diet of children after a prolonged lactation.

Key words: Dental Anthropology, nutrition, weaning stress, Paleopathology

Osteoarthritis and Musculoskeletal Stress Markers (MSM) as indicators of occupational stress in a Catalan Cistercian community

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Santa Maria de Vallsanta appears as an example of the feminine monastic expansion that occurred in Catalonia during the 12-13th centuries AD, related to the Cistercian Reform. According to the literature, the daily activity of the community was mainly based on manual labor, centered on farming and liturgical practice. The aim of this study is to evaluate the osteoarthritic prevalence and its distribution in this group in order to reconstruct their activity pattern. A minimum of 36 individuals were recovered from Santa Maria de Vallsanta site, 17 corresponding to burials of abbesses and prioresses. The presence of osteoarthritis (OA) has been recorded in this sample of 17 female individuals from the religious community, by the scoring methods prepared by Steckel and colleagues (2006) and Buikstra and Ubelaker (1994). Moreover, enthesal changes (EC) have been scored over 23 entheses (from both upper and lower limb) following the already contrasted method developed by Mariotti *et al.* (2004, 2007) to validate OA as marker of occupational stress. OA is seen in a high prevalence in Santa Maria de Vallsanta site, even in individuals under 40. The affectation is often asymmetric and higher in shoulder, hip, and knee. There is a significant correlation in some cases between OA in a particular joint and EC of the muscles involved. Primary OA of hip and knee has been related to physical load from occupation and farming. Therefore, farming may explain the prevalence and specific patterning of OA, according to the subsistence change related with the Cisterian Reform.

Key words: Paleopathology, enthesal changes, activity patterns, farming, liturgical practice

A kidney's ingenious path to trimillennar preservation: renal tuberculosis in an Egyptian mummy?

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The Lisbon Mummy Project (LMP) is a cooperative task between IMI - Imagens Médicas Integradas and the Museu Nacional de Arqueologia (MNA). It started in 2006 and had the support of Siemens Portugal and Fundação Calouste Gulbenkian, Lisboa. It aimed to study the Egyptian mummies belonging to the MNA collection by X-rays, using a computed radiology system and a high-resolution multidetector (64-slice) computed tomography equipment. This non-destructive analysis allowed the investigation of three human mummies, one of which, named Irtieru, is the object of the present communication. In this work, we present a plausible pathology detected in Irtieru, a cartonnage enclosed mummy from the Third Intermediate Period. After careful analysis of the images obtained, a dense bean-shaped structure at the left lumbar region was detected. Its anatomical location, morphology and structure, together with some possible findings in a liver package, were consonant with the diagnostic hypothesis of end-stage renal tuberculosis. This systemic disease may affect several organs and systems, being the urinary apparatus one of them. The affected kidney may slowly and silently be transformed into a mostly calcified non-functioning organ, a pattern also known as putty kidney, very similar to the image found in Irtieru. If this is indeed the case, it will be the oldest example of kidney tuberculosis, the first noninvasive diagnostic proposal of this disease in a wrapped and cartonnage encased Egyptian mummy and the first detected in an intentionally mummified body.

Key words: computed tomography, ancient artefacts, nephropathy, noninvasive study

**“By any other name”: procedures for establishing terminology in
bioarchaeology**

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In the sequence of I BioAnthropological Meeting (I BAM), foundations were laid for the development of a joint project involving Directorate-General for Cultural Heritage, Research Centre for Anthropology and Health and Center for Studies of General and Applied Linguistics, both from Coimbra University, for the creation of specialized and normalized terminology for bioarchaeology. This project started to be defined between 2013 and 2014, with the intention to reinforce the premises originally presented in the first edition of this meeting, and aims to constitute an answer to the absence of an epistemological reflection in this field in terms of the terminology in use. This lack is reflected in the use of a diversity of terms, which are often similar or competing between them, both in academic and technical-scientific production, thus impairing the use of the paleobiological data gathered in the sequence of archaeological fieldwork. The implementation of this project implies an interdisciplinary approach - anthropology, archaeology and linguistics - and is inspired in terminology normalization methodologies already established in other scientific and technical areas. The main goal of the project is to construct a terminological vocabulary in interaction with the scientific community with aims to its recognition, appropriation and utilization by the specialists of this area. In this presentation, we will specify the strategy and process to be adopted, from the constitution of a representative documental archive (*corpus*), the gathering and selection of terms, their description by the bioarchaeological scientific community and a subsequent return of the vocabulary normalized to its users.

Key words: Bioarcheology, Archaeology, Anthropology, terminology, terminological normalization

Paleoparasitological studies in Portugal: first results

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Despite reports of parasites in European archaeological material made in recent decades, paleoparasitological research in Portugal is just beginning. Since 2013, researchers from the Paleoparasitology Lab from Fiocruz-BR seek to expand data on parasitic infections in Portugal by collaborating with archaeologists/anthropologists. In October of 2014 this research has formally begun at the University of Coimbra (UC), with the financial support from the Brazilian Government. Using rehydration (with 0.5% Na₃PO₄ solution) and sedimentation techniques, it was possible to identify helminths from four different *taxa* in sediment samples taken from the pelvic girdle of human skeletons. In some cases, food remains were also identified. *Trichuris trichiura* eggs were identified in three individuals exhumed from São Julião Church in Lisbon. This parasite was also identified in samples from an Islamic necropolis used between the 8th and 12th centuries in Santarém together with *Ascaris lumbricoides* in skeletons that had already been cleaned and deposited in the UC. In modern samples, from the necropolis of the Church of Sarilhos Grandes in Montijo, eggs of *A. lumbricoides*, cf. Trichostrongylidae, Oxyuridae and larvae of Nematoda were found, as well as rice and potato starches, parts of shellfish, and possible plants with medicinal properties. Many data can be obtained with the expansion of paleoparasitological studies in Portugal, helping to expand the knowledge about the way of life of past populations and to identify which parasites were indigenous and which were brought by the various groups that colonized the region. This work is supported by CNPq (process 201416/2014-0), CAPES, FCT.

Key words: Europe, Helminth, ancient diseases, ancient diet

Bone mass in young skeletal women: what's love got to do it?

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In modern populations, reproductive factors (e.g., gestation, lactation, parity) exert a substantial impact on bone mass, both in women of reproductive age and later in life. Also, reduced bone mass in young females from archaeological sites has been interpreted as a consequence of reproductive stress. In order to evaluate the overall effect of reproductive dynamics on bone mass in a historical skeletal population of young women, reproductive correlates (marital status and maternal deaths) and bone mass (bone mineral density, BMD, at the proximal femur and cortical index at the second metacarpal, MCI) were assessed in a sample of 78 women (17 - 39 years) from the Coimbra Identified Skeletal Collection. BMD and MCI were compared within the skeletal sample («maternal deaths» [ICD 10: XV] vs. «other causes of death», and «married/widowed women» vs. «single women») and with young women from two modern epidemiological Portuguese reference samples (from Coimbra and Porto) - acknowledging that the archetypal reproductive histories were different amongst the three groups. Differences among groups are negligible and non-significant, suggesting that a strict reproductive interpretation of premature bone loss in young women from historical contexts is reductionist and unsustainable by empirical evidence.

Key words: reproductive patterns, bone loss, bone mineral density, cortical index, reference skeletal collections

The bigger you are, the faster you age? Analysing body size effects on age-related criteria from the hip bone joints

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New research is emerging regarding the possible effects of environmental and genetic factors on the metamorphosis of bone joint surfaces, and on the accuracy of age at death estimation methods. However, more investigation is still necessary to better understand bone aging, especially regarding variation between different populations. The present study aims to determine if correlates of body size, including joint surface area, estimated body mass, stature and femoral robusticity influence age-related morphological criteria for the pubic symphysis, auricular surface of the ilium and acetabulum. The first author analysed 317 individuals from the Identified Skeletal Collection from the University of Coimbra (Portugal), and 236 individuals from the William Bass Donated Skeletal Collection, University of Tennessee (USA). Adult individuals (≥ 18 years old) of both sexes were studied, but only the pooled sex data are presented, due to the lack of significant results when the analysis was undertaken on sex-specific samples. Body mass and stature were estimated through femoral measurements. Spearman's rank correlation coefficient between bone criteria and age at death ranged between 0.1 and 0.7, suggesting that age is not the only factor influencing the metamorphosis of the hip bone joints. A logistic regression was computed to determine if body size affects hip bone joint degeneration, showing that some, but not all, metamorphosis criteria are affected by skeletal size, with robusticity having the least effect for both collections.

Key words: Pubic symphysis, auricular surface of the ilium, acetabulum, age at death analysis, body size

The paleopathology of rib cage fistulae: challenges and pitfalls

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Diagnosis of pathological conditions in past human remains is a challenging and difficult endeavor, even when biographical records are available, as it is the case of skeletons from reference collections. Establishing a direct causal association between a deadly process and the observable bone changes at the time of death requires both expertise and a careful exercise of differential diagnosis. In order to show how this process is intricate, we present the paleopathological examination of the skeleton 361 from the Identified Skeletal Collection housed at the Bocage Museum, National History Museum (Lisbon, Portugal): a young adult female deceased by pulmonary tuberculosis in 1948. The most striking pathological change consisted on a bony fusion between the shafts of three left ribs (5th, 6th, and 7th) with a perforated central area, with 10 mm in diameter, resembling a draining sinus. The differential diagnosis of these lesions reveals that tuberculosis is the most probable explanation, which is supported by the cause of death registered for this individual. However, ruling out other infections, traumatic, neoplastic and congenital conditions, or iatrogenic causes is a difficult task when detailed clinical or autopsy records are absent. This study shows that a fistula in the rib cage is virtually not diagnosable in archaeological human remains due to the lack of specificity of the bone changes. This is a common scenario and paleopathologists should be aware of this bias when ascertaining or debating the prevalence of past diseases.

Key words: tuberculosis, thoracic wall, Lisbon, 20th century

CraMs: new tool to help anthropologists

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The applicability of craniometry to anthropological research particularly in sex and ancestry estimation and human variation studies is well known. However, traditional craniometrics are insufficient for describing complex shapes and certain craniofacial features. The recent technological advances offer tremendous potential benefits in morphometric data acquisition and morphology documentation. 3D modelling, a common tool in nowadays anthropological research, allows for the extraction and processing of morphological information in a way that is inaccessible to traditional methods. The aim of this study is to present a computer application called CraMs (CranioMetric Measurements). This software will assist anthropologists on craniometric measurements acquisition from 3D models. Moreover, the application allows to extract additional cranial information based on surface projections, and detects the orbits and sutures automatically using curvature analysis and sharp edges detection techniques. Craniometric measurements acquired with CraMs show a decreased intra- and inter-observer error rates when compared to measurements obtained with traditional instrumentation. The utility of CraMs is exemplified with the craniometric data acquisition from 3D models of 20 well preserved skulls from the African slaves' skeletal collection of Valle da Gafaria. Due the extraordinary scientific and heritage value of this collection, it is of paramount importance to have tools to make this collection available to the scientific community without compromising its preservation.

Key words: biological profile, craniometric analysis, slaves sample, 3D models

A possible Madura foot from medieval Estremoz, southern PortugalAna CURTO^{1,*}, Teresa FERNANDES^{1,2}

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Mycetoma resulting from infection by true fungi is known as maduromycetoma and is a common disease in locations with a dry season and poor hygienic conditions occupied by bare-footed peoples. In the past and nowadays it is common in tropical and subtropical areas and although in the past it might have been common in Mediterranean Europe, there are only two paleopathological cases reported in Europe, one in southern Italy and the other in Greece, both published by Plehn in 1928. Under study is a well preserved male skeleton, between 23 and 57 years old and with a stature of approximately 159cm, from a medieval necropolis (13th to 15th centuries) in Estremoz, Portugal. The left foot of this individual showed ankylosis of the calcaneus and cuboid indicating a healing process that led to arthrosis of the calcaneus and talus. The five metatarsals have bone destruction and irregular subperiosteal new bone formation with multiple lytic foci and progressive osteoporosis with very little reactive bone formation as verified by the X-ray, in which we didn't observe any fracture lines. In the left tibia and fibula there is also periostitis at the distal portion. In contrast to the left foot, the right foot has no visible lesions. After a careful differential diagnosis taking into consideration maduromycetosis, actinomycetes, other chronic infections, septic arthritis, gout, trauma, leprosy and rheumatoid arthritis, and following the suggestions of the modified Istanbul Protocol, we concluded that this is a typical case of maduromycetosis.

Key words: Paleopathology, mycetoma, infectious pathology

Biological affinities between Portuguese and North Africans - Dental nonmetric trait analysis

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Dental morphological variation is a phenetic correlate to genetic variation. The statistical comparison of dental nonmetric trait frequencies among samples provides insight into their biological affinities and origins. The Islamic domain of Portugal and the Iberian Peninsula occurred between the 8th and 15th centuries, after the creation of Islam in 7th century Arabia and rapid spread of the Islamic Empire. Popular beliefs, both historical and political views from the early 20th century, and some genetic studies suggest that the genetic impact of the North African presence was limited to Southern Portugal. This work aims to test the hypothesis that Berber and Arabian occupants contributed to the Portuguese gene pool. A sample of 600 identified skeletal individuals from the 19th and 20th centuries, curated at the Department of Life Sciences (University of Coimbra), mostly from Coimbra (Northern Central Portugal), was scored for 61 dental nonmetric traits, mainly using the Arizona State University Dental Anthropology System. The results were compared with previously published data using principal components analysis (PCA) and the mean measure of divergence (MMD) distance statistic. Worldwide, North African and Islamic Iberian archaeological samples were included in the comparison. The results show a close biological affinity between the Coimbra sample and several North African and historic Islamic samples. This finding parallels previous genetic studies, and suggests that Berber and Arabian gene flow into Iberia provides a noticeable contribution to the Modern Portuguese gene pool. Furthermore, the geographic origin of most individuals (North and Center of Portugal) suggests that some findings of Portuguese genetic bipolarity may be disproportionate, which dismisses popular and early sociopolitical conceptions.

Key words: Dental Anthropology, dental morphology, Islamic Iberia, Coimbra Identified Collections, PCA and MMD

**A possible treponemal infection in a young adult from Medieval/Modern
Tomar, Portugal**

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Treponemal infections can occur worldwide and can become apparent in four clinically different syndromes, three of them affecting the skeleton (syphilis, bejel and yaws). In this study we describe a male young adult (between 19 and 34 years old) skeleton from Medieval/Modern Tomar, Portugal, showing a possible case of treponemal infection. Despite the incompleteness of the skull, it was possible to identify a lesion compatible with healed focus of *caries sicca* in a frontal bone fragment which did not affect the inner table. We also noticed bony growth at the hard palate, as well as a thin layer of woven bone at the nasal cavity. All the long bones, both clavicles and both scapulas' acromion were harshly thickened and the latter had thoroughly remodelled bone deposits, indicating chronic bone lesions which were active shortly before death. The long bones also showed some bony plaques with under-cut edges within the new bone deposits, as well as gummatous and non-gummatous lesions and bony nodules. All long bones showed concentric thickening throughout their diaphyses, leading to a complete obliteration of the medullary canal by sclerotic trabeculae in clavicles, radii and ulnae, visible due to the bones fragmentation. Due to the lesions referred above, we consider that this individual represents a typical case of acquired treponemal infection according to the modified Istanbul Protocol as the lesions are usually found with this type of conditions, but there are other possible causes, such as tuberculosis or undifferentiated infectious pathology.

Key words: Paleopathology, treponematosis, syphilis

**A non-union fracture in an ulna from a Bronze Age skeleton
exhumed/uncovered from Torre Velha 3 (Portugal)**

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The archaeological intervention made by Palimpsesto Lda. and the anthropological responsibility from Styx, Lda., between 2008 and 2009 in Torre Velha 3 led to the discovery of different funerary structures dated to the Chalcolithic, Bronze Age and Late Antiquity. From pit [2392], a Bronze Age funerary structure, three adult individuals were exhumed: two on lateral decubitus position, facing each other and, underneath them, a third incomplete individual in right lateral decubitus position. For this last individual, foot bones suggest a female diagnosis according to Silva's (1995). Two proximal fragments of the left ulna's diaphysis of this skeleton display signs of trauma, compatible with a case of non-union fracture. The fragments show matching irregular alterations, namely large false articular surfaces - pseudoarthrosis. Typically, these are associated with misalignment of a fractured bone, causing biomechanical changes including decrease of forearm mobility, nerve damage, embolisms and infections. Clinical literature associates these kinds of fractures to hard pronation and supinations, accidental falls, interpersonal aggressions and/or interaction with animals. So, the aim of this work is to analyse this case of non-union fracture of the ulna, a type of trauma not frequently documented in prehistoric samples, on an individual level but also, as a contribution to the understanding of lifestyle of ancient communities who lived in the Portuguese region of 'Baixo Alentejo' during the Bronze Age.

Key words: non-union fracture, pseudoarthrosis, ulna, Bronze Age

Intraskkeletal heterogeneity of bone mineral density

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Heterogeneity of bone mineral density (BMD) within the skeleton is an important determinant of the mechanical properties of bones, also modifying the risk of fracture. This study aimed to evaluate heterogeneity between the proximal femur and the distal radius, and within different regions of interest (ROI) in the same bone. A subsidiary objective was to assess the value of the radius in the study of BMD in archaeological samples. 51 individuals (24 females; 27 males) from four Medieval Portuguese samples (1 rural, 3 urban) were scanned through densitometry in the femur (ROI: «neck», «Ward» and «total hip») and the radius (ROI: «1/3 distal», «mid distal» and «ultradistal »). There is a strong linear relation between the BMD measured at the ROI of the proximal femur ($r_{\text{neck}^*\text{trochanter}} = 0.787$; $r_{\text{neck}^*\text{Ward}'s} = 0.851$; $r_{\text{trochanter}^*\text{Ward}'s} = 0.641$) and at two ROI of the radius ($r_{\text{ultradistal}^*\text{mid}} = 0.797$; $r_{\text{mid}^*1/3} = 0.685$). The dependence between BMD at the ultradistal and the 1/3 radius is moderate ($r_{\text{ultradistal}^*1/3} = 0.453$). The linear relationship between the variables of the femur and the radius varies from non-significant to moderate. Results are suggestive of skeletal heterogeneity in bone loss both between bones and within the radius in both sexes. Results are probably also influenced by the low precision in BMD assessment at the distal radius - in 39.2% (20/51) of the radii, the densitometer was not able to fully detect BMD. BMD assessment at the distal radius in archeological samples is thus questionable and should not be used as a primary research technique in paleopathology.

Key words: bone densitometry, peripheral DXA scan, femur, radius

A slipped capital femoral epiphysis case study from medieval Estremoz, Portugal

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Slipped capital femoral epiphysis (SCFE) is the result of a fracture at the growth plate of the femoral head that happens most frequently between the age of 10 and 17 years and although it might have some genetic influence, trauma, the adolescent growth spurt and obesity may be contributing factors. In this study we report a SCFE in an individual (RMPE-69) from a medieval necropolis (13th to 15th centuries) in Estremoz, diagnosed as an adult male between 40 and 44 years old. In the left femur we observed a misalignment of the femoral head leading to the shortening of the neck, which is not compatible with Legg-Calvé-Perthes disease and tuberculosis of the hip. The epiphysis was displaced posteriorly and medially with a reduction in the anteroposterior neck-shaft angle, resulting in an enlargement of the femoral head and probably leading to osteoarthritis in both the femoral head and the acetabulum, but without the creation of a new joint for the femoral head as observed in congenital dislocation of the hip. These articulations showed porosity, lipping and eburnation. The knee and foot did not show osteoarthritic changes and there are no lesions related with SCFE or osteoarthritis at the right lower member. Besides the lesions compatible with SCFE, this skeleton also has vertebral degenerative arthritis changes, especially in the lumbar region but also in the cervical and thoracic regions that may be related with the individual's locomotion. A remodelled tear shape trauma (27,17x14,99 mm) at the right parietal was also observed.

Key words: Paleopathology, developmental disorder, trauma, osteoarthritis

A possible case of *Humerus varus* in a female skeleton from the Visigoth necropolis at Villa Rosa Palace in Santarém

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The Visigoth Necropolis at the Villa Rosa Palace (Santarém) was excavated between August and September of 2007. Eight skeletons and three ossuaries were uncovered from this Necropolis dated from the 5th-8th centuries. This sample includes one female adult skeleton presenting bone alterations in the right humerus and both scapulae. The humerus display a deformity of its proximal end. The head is grossly deformed displaying eburnation and the anatomical neck is shortened. The proximal end of left humerus was not recovered. Both scapulae are narrow and have abnormal lateral border convexities. The right glenoid cavity is flat and reveals an area of eburnation on the middle besides some lipping. A slight circular depression in the inferior articular surface of the acromion is visible. The left glenoid cavity was not recovered. The most probable diagnosis for these alterations is *Humerus varus*. However, other diagnoses, such as dysplasia of the scapular neck, scapular dysplasia or osteoarthritis as a result of trauma are also presented and discussed.

Key words: humerus and scapulae deformities, Early Middle Age, Visigoth period, Portugal

Pseudoarthrosis in the left ulna of an individual from the medieval necropolis of Largo Cândido dos Reis, Santarém (Portugal)

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In 2004, in the scope of Projecto de Execução da Reconversão do Largo Cândido dos Reis (led by the municipality of the town), an Islamic (Medieval) and a Christian (Medieval and Modern) necropolis were excavated in Santarém. The Islamic one revealed 422 burials excavated in the geological soil. In the Christian one, 184 graves were registered, which are probably related to Santa Maria Madalena's hermitage in an early stage, and in a later, to the Convento de Nossa Senhora do Sítio da Ordem Terceira de São Francisco. Among the material recovered from the Christian burial site, an individual with more than 30 years of age and of undetermined sex (numbered SLCR 211a) with a complete fracture on the left ulna was recovered. The fracture occurred in the middle of the diaphysis, and it's a possible case of pseudoarthrosis (Rodríguez-Martin 2006 *in* Schmitt, Cunha and Pinheiro 2006). Although it displayed signs of complete remodeling, no union of both fragments occurred. The left radius was also affected by this lesion (three abnormal bone growths were detected along the shaft), as well as the left elbow articulation, that developed arthrosis of maximum level due to the lesion (Crubézy, 1988). The aim of this work is to contribute to the knowledge of this rarely reported condition, as well as trying to determine how it would affect this individual lifestyle.

Key words: trauma, ununited ulna fracture, Christian necropolis, Medieval/Modern Age

A possible case of slipped femoral capital epiphysis in a Middle Bronze Age Skeleton from Portugal (Torre Velha 3, Serpa)

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The anthropological study of the human remains recovered from 21 rock cut tombs from *Torre Velha 3* (São Salvador, Serpa, Portugal), dated to the second quarter of the 2nd Millennium BC, revealed a minimal number of 28 individuals (21 adults, 5 non-adults and 2 unknown). In the rock cut tomb [2497] - [2498], one adult male showed exuberant bone formation in his right femoral proximal epiphysis, slight displacement of the head and a clear thickening of the neck. Compatible alterations such as the widening of acetabulum and new bone formation in its borders are visible on the right *os coxae*. The differential diagnosis for this case includes several possibilities, as *Legg-Calvé-Perthes* disease, slipped femoral capital epiphysis, and trauma. Although various macroscopic and radiological aspects lead us to consider slipped femoral capital epiphysis as the most probable diagnosis, other possibilities can't be ruled out and will be discussed.

Key words: Bronze Age, Paleopathology, *Legg-Calvé-Perthes*, slipped femoral capital epiphysis, trauma

Sex determination using permanent tooth dimensions in adults and non-adults from a Medieval osteological collection exhumed from São Martinho (Leiria)

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The aims of this study were to investigate the performance of the permanent dentition on sex determination of adult skeletons and to apply the sectioning point procedure to immature individuals. The sample consists of 157 individuals (94 adults and 63 non-adults) exhumed from São Martinho, Leiria and currently housed at Museu Nacional de História Natural e da Ciência (Lisbon). Because 66 adults had no teeth and 36 non-adults had no permanent teeth, the final sample was reduced to 28 adults and 27 non-adults. Mesiodistal and faciolingual diameters from all permanent teeth available (n=385, 204 from adults and 181 from non-adults) were taken, and the sectioning point procedure (overall mean of a measurement) was calculated. Below the sectioning point, individuals were classified as females, and above as males. The sex of adults was first determined using the hip bone and then the results were compared with the results of sectioning point procedure. The sex of non-adults was determined only by dental dimensions. In adults, the canine was the tooth with the highest sexual dimorphism and the faciolingual dimension had the highest rates of accuracy. The matching was superior to 80% using only canines (of 12 adults with canine's faciolingual measurements available, 10 corresponded). In non-adults, the permanent canine was present in only 14 individuals and 9 had diameters above and 5 below the faciolingual sectioning point. In this sample, the canine was the tooth with the greatest difference between the dimensions of non-adults and adults, but the second molar and second premolar samples overlapped. The permanent teeth have proved to be valuable for determining the sex of adults, but the results for non-adults were more difficult to interpret without other accurate method that could be used to validate the results obtained using the dentition. Care should be taken when trying to apply the data from adults to non-adults.

Key words: sex estimation, subadults, permanent dentition metrics, sexual dimorphism

Defects of the atlas from 16th century Sardinia (Italy)

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The archaeological excavations carried out in the plague cemetery of 16th century Alghero (Sardinia) brought to light the skeletal remains of 200 individuals, among whom two cases of anomalies of the atlas were observed. The complete skeleton of a male aged 20-30 years showed a posterior schisis of the first cervical vertebra, consisting of failure of the midline fusion of the two hemiarches with a small gap. This type of anomaly has a current occurrence of approximately 4% and its pathogenesis is not yet fully understood. Posterior arch schisis is attributed to the defective or absent development of the cartilaginous preformation of the arch rather than to a disturbance of the ossification. This defect, generally asymptomatic, is considered a benign anatomical variation. The complete skeleton of a male aged 35-45 years showed an occipitalization of the atlas. There is complete fusion of the superior articular facets of the first cervical vertebra with the occipital condyles, and of the anterior arch with the anterior rim of the foramen magnum; the left posterior arch presents no evidence of fusion with the posterior margin of the foramen magnum. Slight tilting of the atlas toward the left side is appreciable. Occipitalization is associated with posterior spondyloschisis of the atlas. No fusions were observed in the other preserved vertebrae. These two individuals showed no other congenital anomalies. The small number of published osteoarchaeological cases of congenital anomalies of the atlas makes any report important.

Key words: congenital disease, posterior arch defect, occipitalization, Alghero, Modern Age

A case of Camurati-Engelmann disease from 16th century Sardinia (Italy)

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The skeletal remains of a male aged 45-55 years, displaying several bone anomalies, were uncovered from a cemetery of Alghero, referable to the plague outbreak of 1582-1583 AD. The skeleton has a stature of about 165 cm. Although the skull bones show a high degree of fragmentation and are poorly preserved, they appear to be severely thickened. An enlargement of the diaphyses of the clavicles, humeri, ulnae, radii, femora, tibiae and fibulae was bilaterally observed. The widening is extended to the metaphyseal region, while the epiphyses are normal. Radiograph and Computed Tomography showed increased irregular cortical thickness and narrowing of the medullary cavity at the level of the upper and lower limbs. The individual was affected by a sclerosing bone dysplasia, a genetic disease characterised by increased bone density. Differential diagnosis led to identify a case of Camurati-Engelmann disease, also known as progressive diaphyseal dysplasia. This is a rare genetic disorder characterized by anomalies of intramembranous bone formation. Approximately 200 cases have been reported in modern literature, whereas no paleopathological evidence has been described so far.

Key words: progressive diaphyseal dysplasia, cortical thickening, Alghero, Modern Age

Evaluation of the potential of odontometry for sex estimation on burned human skeletal remains

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Human teeth are one of the most valuable materials for anthropological research. Their study has been on the rise and has shown a greater interest on the investigation of sexual dimorphism through the odontometry. In remains that have suffered from severe thermic effects, teeth are often some of the most resistant elements of the skeleton and therefore may provide essential data for assessing the biological profile. Most studies are based on crown measurements, leaving unexplored the cementum-enamel junction and the root dimensions. Hence, the present study (part of the Research PrOject of the CEI/XXI Burned SkeleTons - HOT project - aims to overtake this handicap. The main goal is to propose alternative dental measurements at the root level and cementum-enamel junction and assess their applicability in sex estimation, before and after burning. Forty mandibular second premolars, freshly extracted (from individuals of known sex and age) were collected from dentist offices. The sample, composed of teeth belonging to 20 women and 20 men, was burned in the laboratory at 900oC. Significant sexual dimorphism was maintained in the burned teeth, with men presenting larger always dimensions than women. Therefore, this result suggests that sample-specific methods for sex estimation may be of good potential if they are based on the odontometrics of several victims whose teeth have been affected by similar burning conditions. Our results are even more interesting if we take into consideration that the mandibular second premolar is not usually considered to be the most sexually dimorphic tooth - the canine is.

Key words: HOT project, dental root, sexual dimorphism, heat-induced changes, Portuguese population

Preliminary study of ulnar styloid fractures in a sample of the 19th and 20th centuries Portuguese population

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The proposed work aims to study the ulnar styloid fractures in association with distal radioulnar joint (DRUJ) instability in a sample of the Collection of Identified Human Skeletons housed at the National Museum of Natural History and Science of Lisbon through an empirical osteological assessment. The impact of a fracture of the ulnar styloid is uncertain and can be related to a potential dysfunction and instability of the wrist. The osteoarchaeological study analyzed a sample of 116 individuals (63 males and 53 females) with an age range between 16 and 40 years and different birth places, occupations and causes of death, in order to find more evidences about their wrist traumatic conditions associated with the hazards of the ancient life style and occupations. The first preliminary results have shown a low number of traumatic conditions of the styloid (0.86%) against a prevalence of absence of fracture (99.14%). Further studies, with a larger and older sample, are currently going on in order to provide a more complete dataset. Although rare, the identification of ulnar styloid fractures can provide useful information about the causes of these traumas, their effect on wrist mobility and, eventually, their medical treatment. The data collected will be also referred to the occupations of the individuals, male and females, assessing an interesting perspective regarding the hazards and the consequences of the manual jobs on wrist potential damages and the potential gender differences. The results do not seem to indicate a relationship between the ulnar styloid fracture and the dysfunction and instability of the wrist: a fractured ulnar styloid does not seem to affect the mobility of the wrist. Furthermore, in many cases, the difficulties to assess the potential fractures can be related to a fast reossification of the ulnar styloid in loco without requiring a particular medical treatment. Additionally, the data are being collected in a computerized datasheet, created using open source software to catalog the results of the osteological analysis providing an useful dataset.

Key words: biocultural interpretation, trauma analysis, wrist impairment

Experimental Archaeology: analysis of calcined pig bones burned following the Ancient Veneti uses by Photometric Scanner Imaging (PSI), and Fourier Transform InfraRed (FTIR) spectroscopy

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The funerary cremation rites of northern Italy ancient Veneti population (12th century BC - 2nd century AD) were experimentally reconstructed. Pigs corpses, whole body or in parts, were burned on wood pyres built following ancient sources (*Hom. Il.* 23.218ss.; 24.1007ss) and the pyres were extinguished in three ways: spontaneously, by water and using mixture of water and wine. The correlation between the burning/extinguishing damage, bone colours and structural alterations was assessed by means of Photometric Scanner Imaging (PSI), and Fourier Transform Infrared (FTIR) spectroscopy. All three samples underwent a notable increase in crystallinity as a consequence of the exposure to heat, as testified by several similar but easily distinguishable spectral changes: a thinning and a shift towards a higher wave number of the $\nu_1\nu_3(\text{PO}_4^{3-})$ band (1035 cm^{-1}), a drastic decrease in the amplitude of the carbonate absorption bands ($1470\text{-}1400\text{ cm}^{-1}$ and $870\text{-}880\text{ cm}^{-1}$), and a growth of the two hydroxide peaks at 3572 and 3496 cm^{-1} . The increase in the Crystalline Index proves the extent of the growth of the crystalline state as compared with a fresh bone sample taken as reference. The three calcined samples show subtle differences in the crystalline state attained, reflected by significant differences in colour evaluated by the reflectance measurements using the Photometric Scanner, which can be correlated to the different extinguishing procedures. The quenching produced by the liquid on the burning bone is envisaged as the cause of microstructural changes, such as enhanced porosity and reduced crystal size, the degree of which is dependent on the heat of vaporization of the liquids employed for the extinguishing and responsible for the wettability order of the sample examined. The present study has assessed some characteristic features of bones attributed to the ritual burning and extinguishing procedures in an attempt to discriminate them from other diagenetic processes in the study of fossil and archeological cremated bones and which can be correlated to provide parameters that can be used for prediction of the funerary rituals of the ancient Veneti archeological remains and to shed a new light on their ritual procedures.

Key words: Ancient cremation, funerary reconstruction, rituals with wine, bone analysis

Unveiling the evidences of neoplasm in the Coimbra and Lisbon reference skeletal collections

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Research on the past history of oncology is a stimulating endeavor, however the scarcity of systematic studies on neoplasms in paleopathology hampers a broader knowledge of these conditions on skeletal populations. Based on the study of two Portuguese reference collections from the 19th/20th century, we intend to discuss the limits, challenges and prospects on the identification of neoplastic conditions in human skeletal remains. On the biographic files of the *Museu Bocage* Identified Skeletal Collection, Lisbon, and Coimbra Identified Skeletal Collection, neoplasms (malignant and benign) account for 11.8% (91/769) and 8.9% (45/505) of the individuals. The cohort of individuals with malignant tumors under study (n=131) exhibits a female predominance [60% (n=78) females and 41% (n=53) males] and affection of older age categories (mean age at death= 59.6 years, SD=15.6 years). These individuals deceased between 1904 and 1969. According to the biographic analysis, the most prevalent primary organs of affection were: stomach (n=32), uterus (n=21) and intestinal tract (n=18). The macroscopic bone study revealed the presence of destructive and/or proliferative lesions in 62.6% (n=82) of the skeletons, however, a pattern highly consistent with secondary bone tumors was only observed in 17.6% (n=23) of the cases. Our study suggests that in a cohort of individuals deceased by malignant neoplasms, the number of skeletons presenting characteristic diagnostic features is relatively small, even on a well-preserved sample. This research brings new data to the discussion on the past of the oncological ailments.

Key words: metastases, tumors, paleoncology, paleopathology

**Study of bone changes in a sample of shoemakers, tailors and seamstresses
from Coimbra: inferences for activity**

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Jurmain (1999) proposed that models should be created to test the relationship between activities and their skeletal markers. The aim of this study is to use a model generated from contemporaneous clinical literature and test its correlations with skeletal changes. For the purposes of this study, the activity to be tested is sewing. The sample was selected from the Coimbra identified skeletal collection and consists of seamstresses, shoemakers and tailors (n=21, 5 females and 16 males), and an age and sex matched control sample of equal number. The age range of the individuals is 19 to 96 years old (median=45; SD=20.9). The indicators recorded were enthesal changes (EC) (Coimbra method), degenerative joint changes (DJC), markers of occupational stress (MOS) (presence and absence) and robusticity index (RI). This poster presents preliminary findings for the MOS and EC data. The model implies changes in the upper and lower limbs derived from repetitive circular and pedaling movements used in sewing on the dominant side; as well as changes in the vertebral column, sternum and coxae, due to posture during their work. Using cross tabulation and frequency tables, the preliminary results show that presence of MOS specific to sewing is not confined to those individuals who sew, and also that higher frequencies of EC are found in non-sewing male individuals. This demonstrates that the model is not viable nor is the frequency of MOS or EC indicative of specific occupations. In conclusion, MOS and EC cannot be used to determine the activity of sewing.

Key words: occupational stress marker, enthesal changes, sewing, physical stress, repetitive movement

A matter of life and death: microscopic paleopathological study of Portuguese children's sample from 19th to 20th Centuries

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Paleopathological diagnosis obtained from the study of children's remains, tend to have a common feature: the sort of morbid condition. In these individuals, infections, metabolic diseases and trauma combine, paradoxically, high mortality with scarce bone expressions. Bone porosity presence is extremely high in their cranial and post cranial skeleton, and may be attributed to pathology, biological development, and/or diagenesis. However, to distinguish macroscopically between those origins is not easy. The aim of this study, it is to perform a cortical surface exam, to test the reliability of the Scanning Electronic Microscopy (SEM) as a non-invasive diagnostic tool, to determine differences between the bone manifestations mentioned above, and between different aged individuals. For this purpose, 9 single skeletons and bone fragments of 29 individuals from different soundings, all non-adults dating from 19th-20th centuries from *Castelo de Amieira do Tejo* (Alentejo, Portugal) were analyzed. The age at death ranged between 0-6 years, evaluated by dental development. The remains experienced a carbon coating on a vacuum evaporator to confer conductivity to electrons. Compositional analysis by dispersive energy X-Ray spectroscopy was also used. Despite porosity and growth are interlinked processes, there are some information that support the presence of such manifestations in pathological events. Porosity found beyond 5-10mm from the bone end, tends to relate with some kind of food deprivation. This exploratory study shows it is essential to develop news methodologies to shed light on the multifactorial aetiology this type of alterations entailed, for, at the same time, help us to understand the socioeconomic, cultural and environmental context in which individuals lived.

Key words: mortality, porosity, biological development, taphonomy, SEM

Exposed-plane-form enamel defects in a child from the foundling wheel of Santa Casa da Misericórdia, Faro, Portugal (16th-19th centuries)

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During an excavation in *Santa Casa da Misericórdia de Faro*, Portugal, 51 sub-adult individuals that had been delivered to the institution through the foundling wheel were exhumed (16th-19th centuries). One 3-year-old child (with 6 deciduous teeth present) presented a noticeable enamel defect in the occlusal region of the labial surface of deciduous lateral incisors. The differential diagnosis of these lesions gave rise to several possible pathological conditions, namely, amelogenesis imperfecta, dental fluorosis, and dental enamel hypoplasia. The macroscopic and microscopic analyses lead us to consider enamel hypoplasias, more specifically exposed-plane-form defects, as the most probable diagnosis. According to the literature, exposed-plane-form defects are extensive and more commonly found in the occlusal part of the crown, which is in accordance to the observed in the present case. Such defects are the most noticeable manifestation of enamel hypoplasia, presumably representing a pronounced growth disruption. Although several studies have tried to assess the age at which a defect was formed by measuring the distance between the defect and the cemento-enamel junction, others argue that the position of the hypoplasia is more an expression of the pattern of enamel layers than the timing of a particular stress episode. Besides, the extent of an exposed-plane-form defect frequently has no relation to the duration of the stress episode that was in its origin. This child also presents *cribra femoralis* and porosity in the zygomatic bone, pubis, ilia, and ischia, femur, tibia and foot bones. Dental caries affected the mesial surfaces of both deciduous lateral incisors. Moreover, the age-at-death estimation obtained by osteometric and dental methods showed disagreement, providing the first a younger age. Despite the impossibility to infer a specific aetiology for the observed lesions, their study is extremely important for a better knowledge of the degree of stress imposed to the children delivered to *Santa Casa da Misericórdia de Faro*. Other two children (one 1-year-old baby and one 5-year-old child) of this sample also showed enamel defects but in these cases the lesions correspond to the more common linear dental hypoplasias.

Key words: enamel hypoplasia, physiological stress, growth, abandoned children

A possible case of meningitis in a young child, from the medieval/modern necropolis in Santa Maria do Olival, Tomar (Portugal)

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The study of non-adults is extremely important to understand the past living conditions, due to their sensitivity to environmental conditions. Unfortunately the scarcity of non-adults in the archaeological record, their poor preservation and fast deaths during the acute phase of the disease hinders its paleopathological study. This study reports a young child skeleton (approximately 1.5 years old), with an anatomical preservation index of 27.9%, exhumed from a medieval/modern necropolis (13th-18th centuries) of Santa Maria do Olival, Tomar (Portugal). The skull shows some blood vessel impressions observed on the inner surface of the occipital and parietal bones, and signs of an inflammatory process revealed by mild porosity in all of the *pars basilaris* and, to some extent, in the *pars petrous*. In the post-cranial skeleton, porosity was observed in two ribs, three vertebrae and in the left ilium, as well as some new bone formation in the diaphysis of femurs and tibiae and *cribra humeralis*. The endocranial injuries resemble those described in cases of meningitis. However, there are situations in which individuals survived for days, weeks or months, allowing changes in inner table. Changes in the meninges can occur due to various factors such as tuberculosis (tuberculous meningitis), syphilis, scurvy, rickets, bacterial infections, viruses, among others. Although it's very challenging to determine the etiology of meningitis, when we analyzed the skeleton, we were able to exclude some diseases such as syphilis, scurvy and rickets. Leaving the most probable explanations as bacterial and viral infections.

Key words: non-adult, endocranial lesions, infection, paleopathology

Ectopic upper canines in bioanthropology: case-study of two individuals from the archaeological collection of slaves from Lagos (Portugal)

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The maxillary canine is ectopic in approximately 2% of the present day human population, being the palatal position in relation to the arch more frequent than the buccal. Several etiologies can be assigned for this displacement, namely alterations in the arch size - spaced or crowded arches - or absence or diminution in the size of the lateral incisor. This report presents two adult individuals from the Lagos's sample of African slaves, one male and one female, dated from the beginning of the transatlantic trade (15th-17th centuries), with ectopic canines. One individual presented an ectopic permanent upper right canine, exposed buccally, next to the anterior nasal spine. The upper right lateral incisor was possibly missing - due to early loss or agenesis - which could have led to an alteration in the eruption of the canine. However, the bad preservation of the maxilla does not allow further conclusions. Another individual displayed an ectopic permanent upper right canine with palatal location. The socket of the deciduous upper right canine was found in the buccal alveolar ridge, not totally remodeled yet, suggesting its retention even after the eruption of its homologous permanent tooth. Incomplete root resorption of the deciduous tooth, or any trauma in the anterior region, should be considered. It should be highlighted that this individual had the upper incisors modified, with the incisal angles possibly intentionally fractured. The purpose of this communication is therefore to present possible causes for the occurrence of ectopic permanent upper canines, stressing the limitations of such studies in bioanthropology.

Key words: agenesis, tooth retention, eruption disturbances, dental modifications, 15th-17th centuries

The potential of Cementochronology for age-at-death estimation in burned teeth

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The dental structures are considered the most resistant material of the human body, even under extreme conditions such as high temperatures and, therefore, are valuable to Biological Anthropology, both in forensic and archaeological contexts. Nevertheless, the understanding of heat-induced dental changes, essential to infer biological data in unidentified individuals, remains somewhat reduced. Hence, the present study, undertaken as part of the Research PrOject of the CEI/XXI Burned SkeleTons (HOT), is an attempt to extend the research field and to endeavor an alternative method to assess age-at-death. The main objective is to evaluate the viability of counting the tooth cementum lines at two different temperatures (400°C and 900°C). Thus, freshly extracted permanent teeth from individuals of known age and sex were collected in dental institutes. To investigate age-at-death, a sample composed of 60 monoradicular teeth, 23 upper and 21 lower incisors, 7 upper and 8 lower canines (from 30 women and 22 men, ages from 22 to 88 years), were burned at 400°C and 900°C. Although more research is needed, preliminary results suggest that cementum incremental lines are still discernible and countable in teeth burned at 400°C, and visible at 900°C. Therefore, this approach seems promising and may complement other existing techniques towards the positive identification from burned human remains, ensuring maximum data recovery.

Key words: HOT project, heat-induced changes, tooth cementum annulations, histology

Preliminary anthropological study of the Roman Necropolis of Monte Carru- Alghero (Sardinia- Italy)

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The relief of Monte Carru (Alghero), have brought to light a necropolis of the Roman Empire, (400 B.C). The necropolis shows a mixed ritual with 350 burials (200 cremations and 150 inhumations). It is assumed to be attributed to the Roman settlement of Carbia, known to the sources but not found yet. The thirty examined inhumations were subjected to anthropological study in order to delineate the biological profile of each individual considered, following the main anthropological techniques, supported by less common techniques. Trace elements analysis (P, Ca, Ti, Mn, Fe, Pb, Rb, Sr, Zr), of bones and soil and calculation of enamel thickness was performed for five samples. The analysis has essentially shown twenty-five adult individuals, of which 50% are female and for 13% it was not possible to determine the sex. The average age-at-death, estimated mainly by dental wear (Smith), is 30-35 years. The extreme taphonomic alterations of bones allowed estimation of few pathological lesions, mainly upper limbs arthrosis. The dental wear was mainly widespread to first molars; the average enamel thickness measured with micro-CT is 1,17 mm. Trace elements analysis of five burials revealed high percentage of iron in bones and metals and lead in soil. The population of Alghero during the Old Roman Imperial Age shows an average age-at death of 30-35 years and a dental wear primarily affecting the enamel. Trace elements detected suggest an omnivorous diet and high amount of metals in the soil. Further analyses are needed for a better classification of the considered site.

Key words: Paleopathology, dental wear, trace elements, Old Roman Imperial Age

**Paleoparasitological analysis of Roman sewers from *Augusta Emerita*
(Mérida, Spain)**

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The city of *Augusta Emerita* was founded in 25 BC by Emperor Augustus and it was the capital of the Roman province of *Lusitania*. Its sewerage network dates from the foundation of the city. In recent excavations, four sewer stretches were identified, two on the nowadays Almendralejo street and the other two on Espronceda street. The archaeological data indicates that the first two were abandoned on the 3rd century AD, while the others between 4th and 6th centuries AD. Nine sediment samples collected from different depths of these four sewers were analyzed in search for intestinal parasites. Samples were processed with 10% hydrochloric acid (HCL) and the swirl technique was used to separate sand and other inorganic heavy material. Commercial *Lycopodium* spores tablets Batch 124961 were introduced to quantify helminth eggs per gram of sediment. Twenty slides of each sample were analyzed in optic microscope in 100x and 400x magnification. All the samples were positive for helminth eggs. *Ascaris lumbricoides* was present in eight samples with quantifications varying between 9.8 and 514.98 eggs per gram. *Trichuris trichiura* eggs were found in two samples with 30.29 and 140.8 eggs per gram. Both parasites are specific to humans and have been widely found in European archaeological materials from various dating. These parasites have been related to lack of hygiene of inhabitants. The absence of nonhuman parasites indicates that the sewers were used mainly for the dumping of fecal material from human city housing. This work is supported by CNPq (process 201416/2014-0), CAPES, FCT.

Key words: Europe, Helminth, ancient diseases

Forensic Anthropology: Bones, but not just bones

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This presentation will cover current trends in skeletal forensic anthropology, including age determination of the living, but will also focus on aspects such as anthropological analyses of images, such as facial image comparison, photogrammetry and gait analyses. Age estimation is a perennial subject in forensic anthropology, and new research has not least centered on two key aspects: 1) combining several (and usual) age estimation methods to one estimate, and to perform statistical analyses in order to better estimate the error, and 2) utilizing the ever-growing body of CT-scan data from forensic institutions. The former subject is of interest not only in paleoepidemiology (where it has mainly been applied) but also in age estimation of the living. The state-of-the-art for this topic will be given. The latter aspect is based on the forensic institutes performing post-mortem CT. This also means that reams of imaging data, where skeletal features can be extracted, and related to exact, known age-at-death, as well as autopsy findings and medical records. At our Laboratory, we have worked extensively with these imaging procedures - in connection with age-estimation, and results will be presented. Finally, at our Laboratory we perform anthropological analyses of persons (perpetrators, suspects) as captured on CCTV and surveillance video. Our techniques includes photogrammetry and gait analyses and facial ID. Our modus operandi, as well as some of our research will be presented.'

Intra-skeletal variation in microbial invasion of bone and the influence of adipocere formation

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Fossil and archaeological bone show great variability in their susceptibility to microbial destruction with differences in histological integrity observed within the same microenvironment. Soft tissue decomposition may contribute to this variability as it occurs concurrently with other taphonomic processes. For example, adipocere shows within-individual variation because there are areas with higher concentrations of adipose tissue or in areas that retain moisture. This study investigates the presence of microbial invasion across one adult *Sus scrofa* specimen that was interred within a mass grave with variable decomposition as the anterior half was located in the core of the grave and the posterior half was located along the periphery. The mass grave consisted of ten individuals totaling 600 pounds of body mass. Thin-sections were prepared by Frost's revised rapid manual method [1] and histological attributes were compared for the extent of microbial invasion related to gut proximity. In addition, this study investigated the potential for adipocere to restrict microbial invasion after formation. Results suggest that gut proximity does not influence the extent of microbial invasion from enteric microorganisms as limb bones showed increased microbial activity relative to the rib samples. Moreover, adipocere formation does seem to confer some preservation to bone microstructure as the core samples exhibited postmortem alteration, but it was restricted to the sub-periosteal region. However, the peripheral samples were variable in their susceptibility with the rib exhibiting little to no observable alteration.

Key words: decomposition, histology, Anthropology

Taphonomic alterations of animal bone induced in different standardized soil conditions: biomechanical pilot study

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The burial site is an ever-changing system with many agents interfering, which makes investigating the individual factor influence difficult. Creating a comparable, repeatable and standardized experimental environment is thus essential. To evaluate taphonomic bone alterations biomechanical analysis is used, yet vast of the research can be hardly called recent [Battaglia 1985, Ruff 1995]. The aim of this study was to biomechanically evaluate the bones incubated in standardized soil conditions. The vertebrae from clinically healthy pigs, Polish Landrace breed, were incubated for 113 or 290 days in three different soils. Standard soil, standard soil enriched with copper and standard soil enriched with CaCO₃ were used. Fresh bones and bones after 113 and 290 days of incubation, respectively, were weighted and static compression tests were performed using MTS 858 Mini Bionix. The approx. 40% vertebral weight loss was observed after 113 days of incubation and approx. 58% weight loss was seen after 290 days, regardless of soil conditions. Biomechanical analysis showed that maximal compressive strength decreased significantly (approx. 50%) after 113 days of incubation for all three soils when compared to fresh vertebrae. After longer incubation, the subsequent decrease of the maximal compressive strength was noted: approx. 70% in standard and copper enriched soils and approx. 93% in CaCO₃ enriched soil. Also, the mechanical characteristics differed significantly for vertebrae incubated longer when compared to fresh bone. We believe that the most intensive degeneration changes of the bone appear in the first three months of incubation, regardless of the influencing soil factors. Soil conditions seem to influence the bone properties in greater degree in the later phases of taphonomic process.

Key words: diagenesis, vertebrae, compressive strength

**Human identification in context of catastrophe:
preliminary report on the remains recovered from the Parish Cemetery of
Penco, Chile**

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In 2010, Chile was struck by an earthquake that left the country shaken up. The power of the earthquake provoked the fall of one of the walls of the Parish Cemetery of Penco (VIII Region of Chile), exposing and scrambling the bodies located in the niches. The solution presented at the time, was the cremation, however this decision was not well accepted by the families. Here, a group of anthropologists from the University of Concepción attended to the Cemetery in order to offer their services to the community. This was the start point of the Human Identification Project. Taking in consideration the diverse cultural context of Chile, the intervention counts with a holistic approach, since both physical and social anthropologists are involved in the identification process. There is an estimated number of nearly 400 individuals, 123 males and 78 females, most of them over 50 years old, spread in 300 niches. The bodies presented various stages of decomposition, although skeletonization was the most frequent. The main goal of this intervention is to individualize and identify most of the remaining bodies, in order to return the materiality of the ritual bond. At the beginning of the identification process, around 100 individuals were identified using just circumstantial evidence. Currently the physical anthropology team has analyzed around 120 individuals, in the proper facilities. The social team is now preparing another set of interviews with the families, in order to obtain more specific information. To enhance the identification process, the project is using the AM/PM software, facilitated by the ICRC. So far the collected data, both antemortem and postmortem, is currently being translated to the program in order to test how the comparison process occurs.

Key words: Forensic Anthropology, earthquake, Bío-Bío region, multidisciplinary approach

What can we learn from compensatory movement?

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The human body is designed to achieve daily motor skills. However, some motions are restricted by factors such as injury or congenital malformations. In these cases, movements are often adjusted to meet physical demands, usually involving compensatory movements (CMs). CMs are those changes in normal motion patterns that allow for the completion of tasks when strength or mobility is restricted. In bone structures, CM can be inferred by comparing sizes and robusticity asymmetries between bilateral bones or anatomical regions. Differences between structures with overload and under-load should be clear. Three cases of compensation were found in the XXI Century Identified Skeletal Collection that show clear compensatory patterns associated with antemortem trauma: a female individual with possible crutch use, a 74 year old male with long period of bed rest, and an unidentified skeleton with consolidated fractures in left forearm. In these cases, CMs can be used as an individualization trait and provide information leading to positive identification in forensic anthropology principally due to evident changes in life style or particular ways to perform movements and known ante-mortem characteristics including trauma and congenital malformation. The goal of this presentation is to evidence that abnormal movements and/or gait can be essential to identification in forensic anthropology.

Key words: compensation movements, ante-mortem trauma, identification

**A deep sewers murder investigation: a case of successful teamwork
between forensic pathologist and forensic anthropologist**

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The fields of forensic anthropology and forensic pathology have been intertwined as part of a well known and successful relation. The forensic anthropologist must not be confined to lab work, as well as the forensic pathologist should not neglect the fields of osteology or physical anthropology. Soft tissues or its absence should no longer detain the domain of both fields. We report a forensic case of a decomposed body found inside a sewer, presumably belonging to an individual missing for four months. He was known to rob sewer lids in the area. Positive identification was achieved by finger-ridge analysis. The autopsy confirmed the advanced stage of decomposition, mostly saponification; external examination revealed two holes on the back of his jersey compatible with dispersion of shotgun pellets and a discriminative identification sign (tattoo) on the left arm. Internal examination showed that the body cavities were filled with putrefactive matter, and the holes described on the clothing had caused multiple fractures on the right side part of the chest (scapula, clavicle and 2nd rib) and in the dorsal and lumbar vertebrae. Five vertebrae, right scapula, pubic symphysis, 4th rib and left femur were collected for further anthropologic studies. The pellets were also collected in order to proceed with the police investigation. The collaboration of the forensic anthropologist in a side-by-side co-work with the forensic pathologist proved to be of paramount importance to accurately determine the cause and manner of death in this particular case.

Key words: decomposition, manner of death, forensic cooperation

Is it possible to apply standardized decomposition stages when estimating the PMI of buried remains?

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Estimation of the postmortem interval (PMI) is critical to reconstruct the events surrounding death. Despite representing a pertinent legal question, PMI estimation is difficult. This is confirmed by the lack of reliable methods, particularly when it comes to the post-skeletonization period. Some authors present time-successive stages of increasing decay that suggest that the degree of weathering is related with the amount of time remains have been exposed. However, when dealing with buried remains, this process will take an increased amount of time as many of the most destructive agents will be shut out. Therefore, burial represents a unique environment which has not been studied often. This study focused on degradation of remains in a burial context. The remains were scored according to Behrensmeyer (1978) and Galloway et al. (1989). To understand the reliability of degradation when dealing with short PMI's, we studied the remains of two piglets buried during 9 months. To study reliability of degradation in longer PMI's, we analyzed 86 human skeletons buried in coffins with PMI's ranging between 12 and 19 years. When it comes to short-time spans, the decay of buried remains followed the referred stages, but when it comes to longer periods the stages of degradation do not present a relation with PMI. Therefore the burial creates distinct micro-taphonomic environments which will influence the progression of decay, so these stages should not be used to study buried remains. PMI estimation is a difficult task. Trying to estimate it based on simple variables can be misleading.

Key words: Forensic anthropology, taphonomy, degradation, skeletonization, postmortem interval

Size of mandibular canines as a tool for sex diagnosis in a Chilean population

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The diagnostic of sex in forensic anthropology is of great importance for the estimation of others parameters of the “biological profile” of the individual. In order to use a specific element of human body, to diagnostic sex, this must be sexually dimorphic. There is some evidence of the sexual dimorphism in human teeth, mostly in mandibular canines. Several studies have been developed in this matter, and it appears that with tight age ranges, between 17 and 25 years approximately; there are statistically significant differences between men and women. In this investigation, through the use of a digital caliper the mesiodistal and buccolingual diameters were measured on the pieces 33 and 43 of in 84 people (42 male and 42 female) who lived in the province of Concepción, Chile. The ages vary between 12 and 56 years. These data were analyzed with SPSS and it was applied the t test for significant differences between sexes, and logistic regression for sample classification as male or female. As a result, were found statistically significant differences between men and women, nevertheless, results are depending on the age group under analysis, as well as right classification percentage by use of a logistic regression. Highlights results obtained in subadult age group, between 12 and 18 years, which have the highest right classification percentage.

Key words: sexual dimorphism, Dental Anthropology, Forensic Anthropology, mesiodistal diameter, buccolingual diameter

Sex diagnosis through automated 3D geometric morphometrics of the Tali bones

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A recent method for automated digitizing of landmark coordinates was tested on a sample of 100 left tali from the CEI/XXI collection (Ferreira et al., 2014), with the aim of creating an automated method for sex diagnosis from 3D scanned bones. The sample is composed by virtual representations of the morphology, obtained with a NextEngineTM. Both sexes are represented equally, with 50 females and 50 males 3D scanned tali. On each talus we obtained 256 pseudolandmarks, producing a high-density 3D representation of the shapes of every talus. By applying the Geometric Morphometrics toolkit as well as Machine Learning techniques, a classification model for sex diagnosis of the talus was developed. The preliminary results show an error-rate of 11%, and the most determinant factor for classification, using the talus, was the centroid size. Finally, it should be noted that the model is reproducible and flexible enough to be used with any other bones, and has the potential to give insights about metrics not perceived before, that could be very useful in Forensic Anthropology.

Key words: Virtual Anthropology, machine learning, auto3Dgm, geomorph

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Child death in Portugal: an anthropological view

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Childhood is the period of life between birth and puberty [0-12 years]. Its evolution may be interrupted by natural or violent death. This study aims to access how the region (Coast/Interior) and the environment (Urban/Rural), where these children lived, may have influenced the number and cause of death; as well as to determine which were the main underlying risk factors. This evaluation joins aspects of health, cultural and forensic anthropological views. A study of 149 child death cases, of the Central Area of Portugal and Islands (Madeira, Azores), between 2003-2012. It was performed through review of the autopsy files and statistical analyses of the data obtained. **Results:** In the files where information concerning residence was present (139 cases), 60.7% of deaths at Interior areas and 52.7% of the Coastal ones, occurred in Rural environments. As a whole, Natural Death incidence was higher than Violent. However, while Natural Deaths were more frequent at the Interior (Rural) areas; Violent causes were mostly detected at the Coast. Detailed characterization of sex, age, population affinity, nationality distribution, risk factors and death causes will be presented. In general, male children aged between 1 month and 1 year were the major victims. Geographical, human and cultural characteristics of the regions where these deaths took place determined the number and cause of death in Childhood. Moreover, unexpected data-concerning modifiable risk factors-was disclosed. Thus, educational sessions to the different local populations could reduce Child Mortality.

Key words: children mortality, Forensic Pathology and Anthropology

Application of micro-CT in evaluation of early diagenetic changes of the animal bone

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The overall bone microstructure evaluation, be it in medical sciences or forensic ones, can be performed with good results using micro-CT scanning. It can be used to estimate tissue mineral density (TMD) as well. Recent research encourage also the micro-CT application when evaluating the diagenetic alterations of the bone. The aim of this study was to compare the structure of freshly harvested cancellous bone and bone incubated for 113 days in defined soil environment. The vertebrae from clinically healthy pigs, Polish Landrace breed, were incubated in light soil (pH 4,8) in constant temperature and moisture. After 113 days, the bones were scanned using BRUKER SKYSCAN 1172, high resolution micro-CT scanner. Basic set of parameters for characterization of cortical bone was evaluated: Bone Volume Density (BV/TV), trabecular thickness (Tb.Th), trabecular separation (Tb.Sp), trabecular number (Tb.N) and closed porosity (Po(cl)). After 113 days of incubation, it was observed slight decrease in BV/TV with simultaneous, approx. 30% increase of the mean distance between the mid-axes of the structure (Tb.N decreased). It seems to be a result of the increase of both Tb.Th and Tb.Sp - the trabeculae became more "spongy like". Also, the closed porosity of the incubated sample was noted to be approx. 30% lower than in the fresh sample. The obtained results encourage further, wider research on the diagenetic alterations of bone structure using micro-CT.

Key words: taphonomy, vertebrae, soil, structure, density

The protocol for the preparation of burned identified skeletons of the CEI/XXI collection

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Within the forensic sphere, the burned skeletal human remains are recovered from several and diversified contexts. Although the forensic context may vary considerably, all cases benefit from the application of comprehensive knowledge and understanding of the effect of heat-induced changes in human remains. The investigation of these changes will take advantage of the compilation of partially burned skeletons stemming from the new CEI/XXI identified collection that is being assembled at the Department of Life Sciences of the University of Coimbra. Here, we present our protocol for the preparation and examination of skeletons. The collection is mostly composed by skeletons from individuals who died during the 21st century of both sexes with ages-at-death between 29 and 99 years old. Some of the skeletons are being partially burned under laboratorial conditions, which varies in duration (75 min to 195 min) and maximum temperature (400oC to 900 oC) thus constituting the first collection of identified skeletons , experimentally burned, in the world. However, their collection, analysis and storage are fraught with problems and complications. Although still ongoing, our current protocol was developed to maximize post-burning preservation and to study many variables known to be associated with heat-induced changes. It encompasses several steps that range from the examination of the skeleton before its burning until its analysis and storage after burning. This protocol allows minimizing errors in data collection, sometimes carried out by several people, and expediting the preparation of skeletons for prospective research. It has also been providing us a substantial body of knowledge regarding the nature of the heat-induced changes in bone, thus contributing for the development of more suitable anthropological techniques.

Key words: Forensic Anthropology, HOT Project, heat-induced changes, taphonomy, curation

Sex Estimation based on clavicle and sacrum in the Portuguese Population

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The estimation of sex is one of the fundamental steps in the construction of the biological profile from skeletal remains. The examination of morphological characteristics of the pelvic bone is the most reliable technique for estimating sex. The skull and the long bones are the next most important anatomical regions to estimate biological sex. However, in several situations, the human skeleton suffers taphonomic changes particularly affecting the pelvic bone due to its irregular shape. In some cases, the most dimorphic bones may be missing, making necessary to develop techniques that enable sex estimation based on other, less dimorphic bones. When dealing with incomplete or fragmented remains, the metric analysis can be very useful. In addition, these methods are easily reproduced by various experts, and there is always the possibility of calculating the error inherent in the method. The goal of this study is to investigate the sexual dimorphism of the clavicle and sacrum in the Portuguese population, based on anthropometric measurements. The metric analysis of the clavicle was made on 123 sample (63 females and 60 males) and sacrum was made on 99 samples in sacrum (54 females and 45 males) belonging to the 21st century identified skeletal collection (CEI/XXI) from the Laboratory of Forensic Anthropology, Department of Life Sciences, University of Coimbra. The method applied to the clavicle was described by Oliver (1960) and the metric measurements used was: Maximum length of the clavicle; antero-posterior diameter of the median line; center line of superior-inferior diameter; diameter of the clavicle; maximum internal width (sternal end); external maximum width (acromial end). In sacrum the method propose was based on anthropometric measurements described by White *et al.* (2012): antero-posterior diameter of the body of 1st sacral vertebra; transverse diameter of the body of 1st sacral vertebra; maximum lenght of sacrum; auricular surface height; middle breadth of sacrum; ventral height and dorsal height. As expected the results of this research showed that the morphometric analysis of the clavicle and sacrum in CEI/XXI is sex-related.

Key words: Forensic Anthropology, biological profile, sex estimation, clavicle, sacrum

Study of bone preservation in the 21st Century Identified Skeletal Collection

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There are many factors that influence the cadaveric decomposition, such as morphology, bone mineral density, pathologies, age-at-death, sex or post-mortem interval (PMI). It is our purpose to analyze the state of preservation and the influence of taphonomic factors in the bone weight in a sample of 100 skeletons from the 21st Century Identified Skeletal Collection (CEI/XXI). In order to study the preservation, a grade system will be attributed to calculate the general preservation index (GPI). 29 anatomic zones will be analyzed to calculate the value of GPI. The total skeletal weight will be measured. The relation between weight, GPI, and taphonomic factors will be analyzed. Following previous research (Ferreira, 2012), it is expected that the worst preserved skeletons will be lighter than the better preserved ones. Moreover, it is also expected that a relationship between sex and age-at-death with GPI and skeletal weight will be found, with younger males being heavier and better preserved than older females.

Key words: taphonomy, 21st Century Identified Skeletal Collection, general preservation index, skeletal weight

The value of bone pathology in the identification process in Forensic Anthropology: Osteoporosis, cases studies form the Parish Cemetery of Penco

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The Forensic Anthropology applies its skills in the process of identification of an individual from the skeletal remains, through the reconstruction of a biological profile of general and individual each study subject. The latter considered the analysis of the bone diseases that allows a direct approach with regard to the possible signology of this. For this reason, this study of a preliminary nature and pioneer in Chile, is based on 5 cases of possible Osteoporosis, performed on a sample of the contemporary parish cemetery of Penco (Biobio Region), which presents a descriptive and exploratory nature and is focused on a qualitative methodology for the study of cases. Of these 5 individuals, 3 were female and 2 male, presenting an age range between 45 - 75 years. All of them presented a possible scenario of Osteoporosis, developed secondarily with respect to another pathological condition already present, manifesting itself in a piecemeal fashion to widespread, affecting mainly the spine of the studied subjects. The major constraints during this research were: a limited time, a small sample of individuals for study and lack of adequate technology for more comprehensive examinations. By suggesting new studies in the country which they consider a representative sample of study subjects, in addition to the technology necessary for the diagnosis of the pathology, as well as analyze the relationship between Osteoporosis and Osteoarthritis.

Key words: biological profile, Paleopathology, osteoarthritis, individual features, clinical symptomatology

Warping in Burned Human Skeletal Remains: assessing the influence of bone collagen through vibrational spectroscopy

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Analyzing burned human skeletons is difficult due to heat-induced changes (HIC) that interfere negatively with the application and reliability of bioanthropological methods. Therefore, the study of remains burned in controlled experiments has shown to be important in understanding the effects of heat on bones. Warping has been used to determine the pre-burning condition of the remains. These modifications have been associated more often with corpses (with soft tissues), but also arise in unfleshed human burned bones. However, it has been demonstrated that this alone is not enough to make such distinction. So, it has been recently suggested that this could be due to collagen contraction and be thus dependent of the preservation of the collagen-apatite bonds. In brief, bones with well preserved collagen-apatite bonds have a greater elasticity and therefore, are more likely to deform and fracture. We investigated the association between bone collagen content and the occurrence of warping in a sample of bones burned in laboratorial context. The presence of collagen was analyzed in two different samples (archaeological/forensic) through a vibrational spectroscopy technology - FTIR-KBr. Our preliminary results show that bones with more collagen appear to be more susceptible to warping. However, age, sex, post-mortem interval, burning duration, maximum temperature and burning dynamic may have a significant effect on the occurrence of heat-induced warping. This research gives important insights about the pre-burning condition of skeletal human remains. Further investigation may be able to develop a method to estimate if the burning occurred in fleshed or unfleshed (dry/green) remains.

Key words: Forensic Anthropology, HOT project, pre-burning condition, heat-induced changes, FTIR-KBr

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