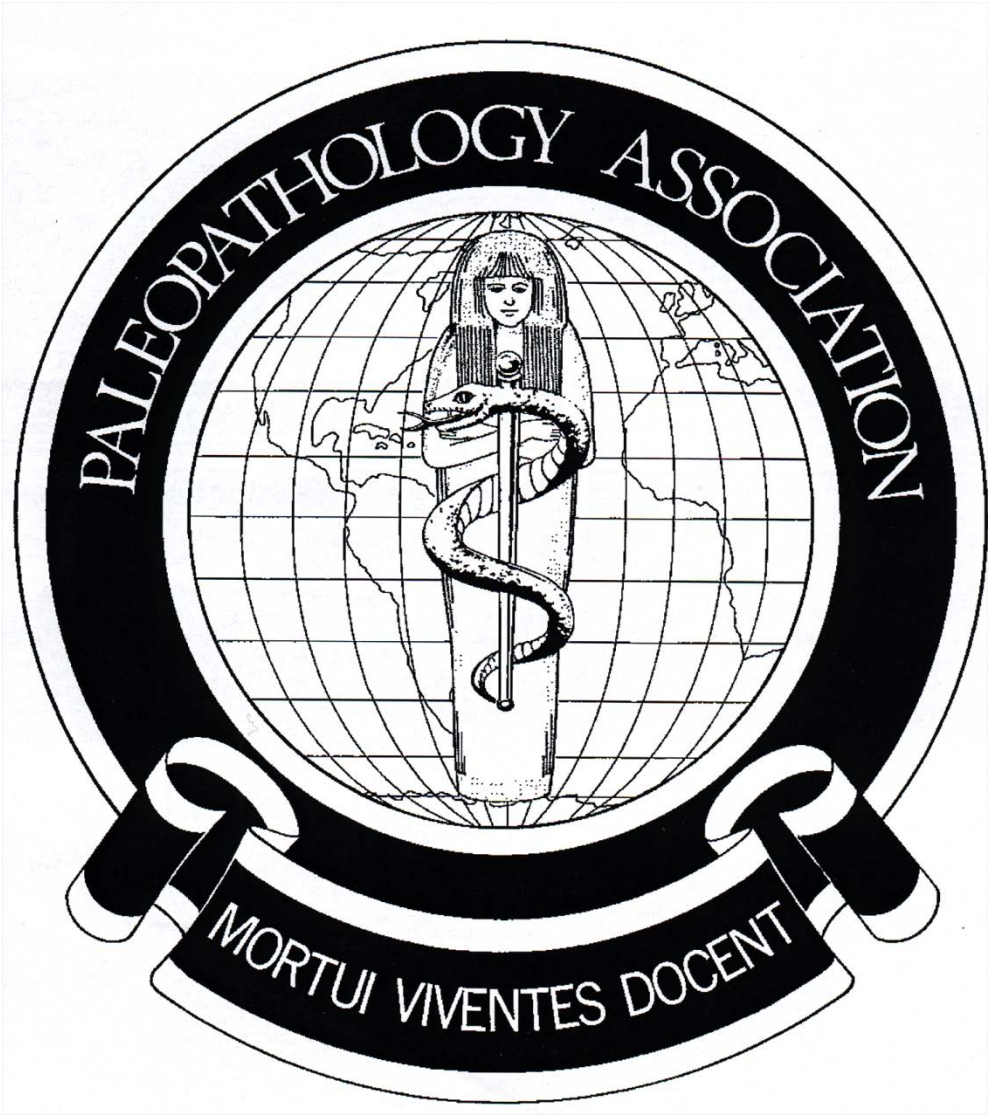
Supplement to the *Paleopathology Newsletter*

PALEOPATHOLOGY ASSOCIATION

SCIENTIFIC PROGRAM & ABSTRACTS



20th EUROPEAN MEETING
LUND, SWEDEN
August 26-31, 2014

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Cover originated by Patrick Horne

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PALEOPATHOLOGY ASSOCIATION
20th European Meeting
Lund, Sweden
August 26-31, 2014

SCIENTIFIC PROGRAM

TUESDAY, AUGUST 26

14:00	Registration opens
18:30-21:00	Social Event, Get together at Lund University Historical Museum

WEDNESDAY, AUGUST 27

09:00-18:00	Poster Session
09:00 - 09:15	Opening of The 20th European Paleopathology Association Meeting (PPA) by Sven Strömqvist, Pro Vice-Chancellor of Lund University
09:15 - 09:30	Local organizers: Announcements
09:30 - 09:45	Maria Cinthio: The history of Lund
09:45 - 10:30	Crister Ceberg: MedMAX – A new possibility for synchrotron radiation imaging in paleopathology?
10:30 - 11:00	Coffee Break: Presentation of posters 1-7
11:00 - 12:00	Dental pathology: Moderators: Torbjörn Ahlström and Caroline Arcini
11:00	Jakob, Tina: Dental disease in a high-status post-medieval population from Ambel, Zaragoza, north-east Spain
11:20	Johannesdottir, Erna: Oral pathologies and dental modification from 19th century enslaved Africans
11:40	Wasterlain, Sofia: Dental modifications in a skeletal sample of enslaved Africans found at Lagos (Portugal)
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13:00 - 15:00	Parasites and infections I: Moderators: Charlotte Roberts and Albert Zink
13:00	Côté, Nathalie: A high throughput approach to genotype ancient parasite remains
13:20	Bos, Kirsten: Analyses of *Mycobacterium tuberculosis* genomes from the pre-contact New World using high throughput sequencing
13:40	Matos, Vitor: Tuberculoid leprosy: a forgotten clinical entity in paleopathology
14:00	Mitchell, Piers: Human Intestinal Parasites from a Mamluk Period Cesspool in the Christian Quarter of Jerusalem: Evidence for Long Distance Travel in the 15th Century AD
14:20	Pedersen, Dorthe Dangvard: Diagnosing tuberculosis in skeletal populations
14:40	Primeau, Charlotte: Childhood illnesses recorded in the adult skeleton: infectious middle ear disease, Harris lines and linear enamel hypoplasia
15:00 - 15:30	Coffee Break: Presentation of posters 8-15
15:30 - 16:50	Parasites and infections II: Moderators: Niels Lynnerup and Mary Lewis
15:30	Santos, Ana Luisa: Syphilis in life and death: different clinical and paleopathological diagnoses in the same individuals
15:50	Yeh, Hui-Yuan: Intestinal Parasites in a mid-14th Century Latrine from Riga, Latvia Fish Tapeworm and the Consumption of Uncooked Fish in the Medieval Eastern Baltic Region
16:10	Jankauskas, Rimantas: Archaeoparasitology in Lithuania

16:30	Maixner, Frank: The 7th century Alemannic gravesite of Niederstotzingen in southern Germany - Molecular relationship analysis of the human skeletal remains and screening for pathogens
16:50 - 17:50	Joint diseases: Moderators: Niels Lynnerup and Mary Lewis
16:50	Alves Cardoso, Francisca: Exploring degenerative joint changes between and within age at death cohorts
17:10	Landis, Sabine: The earliest case of probable hip joint osteoarthritis in MLD 46 (*Australopithecus africanus*)
17:30	Wiltschke-Schrotta, Karin: Hip disorders in prehistoric populations of Austria

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08:30 - 09:15	Barbara Bramanti: Inquiring into the Medieval Plagues
09:15 - 09:55	General health and metabolic diseases I: Moderators: Torbjörn Ahlström and Caroline Arcini
09:15	Buckley, Hallie: Skeletal evidence for a prehistoric metabolic syndrome: Diffuse idiopathic skeletal hyperostosis and gout in a 3000-year-old Pacific Island skeletal assemblage
09:35	Geber, Jonny: Skeletal manifestations of stress in child victims of the Great Irish Famine (1845-52): Prevalence of enamel hypoplasia, Harris lines and growth retardation
09:55 - 10:20	Coffee Break: Presentation of posters 16-23
10:20 - 12:00	General health and metabolic diseases II: Moderators: Torbjörn Ahlström & Caroline Arcini
10:20	Jukić, Marijana: Life and death of children at Čerina: bioanthropological analysis of young children remains from Josipovac-Čerina site, Croatia
10:40	Meyer, Anja: An assessment of metabolic bone disease in a historic Chinese miner skeletal sample from the Witwatersrand, South Africa (AD 1904 - AD 1910)
11:00	Sarkic, Natasa: Parietal thinning, comparative radiological study of 6 cases, one from ancient Egypt and five from Spain (XVI Century)
11:20	Jakobsen, Lykke Schrøder: Manual segmentation and visualization of the gastrointestinal tract of a 17th century Korean general
11:40	Salo, Kati: Paleopathology of nine cemeteries in Southern Finland, taphonomy and some problematic case studies
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13:00 - 14:00	General health and metabolic diseases III: Moderators: Pia Bennike and George Maat
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13:20	Panhuysen, Raphaël: Living conditions in early medieval Dorestad
13:40	Watts, Rebecca: Childhood development and adult longevity in archaeological British populations (AD950-1855)
14:00 - 15:00	Trauma I: Moderators: Pia Bennike and George Maat
14:00	Allmäe, Raili: Salme II ship-grave: examples of edged weapon injuries
14:20	Pany-Kucera, Doris: "Warriors versus working men"? – An entheses and joint study on the early medieval skeletal remains of Thunau/Kamp
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15:30	Buzhilova, Alexandra: Post-traumatic signs of blunt trauma of the skull of the Upper Paleolithic man from Kostenki XIV, Russia
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09:15 - 09:55	Miscellaneous I: Moderators: Torbjörn Ahlström and Caroline Arcini
09:15	Berezina, Natalia: Cases of head manipulation in the Medieval groups of Eurasian nomads
09:35	Buckberry, Jo: Developmental conditions at Stirling Castle
09:55 - 10:20	Coffee Break: Presentation of posters 32-39
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10:20	Drew, Rose: Women and non-adults aboard Warships in the 16th and 17th Centuries
10:40	Kim, Myeung Ju: Button osteoma cases found in Joseon Dynasty Human Sample Collection of Korea
11:20	Rios, Luis: Skeletal and dental health status in remains exhumed from a cemetery of political prisoners from Spain postwar (1938-1943)
11:40	Binois, Annelise: The silence of the lambs. A paleoepidemiological approach for the identification of "murrain" in archaeological deposits
12:00 - 13:00	Lunch
13:00 - 14:20	Miscellaneous III: Moderators: Tina Christensen and George Milner
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14:00	Lynnerup, Niels: dissection material from a hospital cemetery in Copenhagen, Denmark
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14:20	Collier, Larissa: A model of violence: Archaeology and bioarchaeology in prehistory
14:40	Roberts, Charlotte: Applying the "index of care" to a person who suffered leprosy in late Medieval England
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15:50	Milner, George: Selective mortality in Medieval to Early Modern Denmark illustrated using skeletal trauma

16:10	Minnikin, David: The potential of novel lipid biomarkers for the diagnosis of tuberculosis in the Pleistocene
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2. Binois, Annelise: From the womb to the tomb. A medieval case of maternal and foetal mortality following a dystocic calving
3. Boston, Ceridwen: Boys ...and girls... point toes: occupation and Shepherd's fractures in two archaeological populations
4. Boyer, Charlotte: A challenging diagnosis – Sct. Birgittes Chapel A 171 a case study
5. Bäckström, Ylva: Prisoners of war and perimortem fractures
6. Cook, Della Collins: Clinoid bridging and developmental pathology: an example from Indiana
7. Cancelled
8. Garcia, Susana: Rib lesions and other signs of infectious in non-adults from the medieval necropolis associated with the São Martinho Church (Leiria, Portugal)
9. Haelm, Juliane: Plagiocephaly and torticollis of three individuals from a Kurgan (Scythian Period) in Majemer, Kazakhstan
10. Justus, Hedy: Skeletal abnormalities observed in an adult from Early Medieval Poland: Is this a rare archaeological case of Down Syndrome?
11. Jørkov, Marie Louise: Diet and health during the Industrial Period in Copenhagen
12. Kramis, Simon: Möller-Barlow disease in archaeology: Preliminary study of biochemical detection
13. O'Sullivan, Niall: Genetic analysis of the Iceman´s coat fur: are there indications of ancient human blood traces?
14. Maixner, Frank: World Mummies Map - a WebGIS platform spotting worldwide discoveries of mummified human remains
15. Mank, Elise: Microcephaly as observed in the late 19th century cemetery of the Meerenberg psychiatric hospital – diagnostic issues and the value of population specific data
16. Matos, Vitor: Perinatal deaths in the «Ermida do Espírito Santo» (Almada, Portugal): between affection and marginalization
17. Moghaddam, Negahnaz: Evidence of trepanation in Late Iron Age Switzerland (420-240BC)
18. Nikolova, Silviya: A case of multiple Wormian bones in a combination with completely preserved metopic suture in adult skull
19. Novotny, Friederike: Sequelae of a neonatal septic arthritis in a Celtic woman
20. Nowakowski, Dariusz: Case of myositis ossificans progresiva on 19th century adult male skeleton from Adelaide, Australia
21. Teul, Iwona: Radiological, tomography and histological methods applied to osseous changes due to otitis media and mastoiditis in a pre-historic and historical skeletal material from Poland
22. Paladin, Alice: Paleopathological study of human remains from prehistoric Trentino-Alto Adige, Italy
23. Primeau, Charlotte: A test of inter- and intra-observer error for an atlas method of combined histological data for the evaluation of linear enamel hypoplasia
24. Quintelier, Kim: Investigating the late/post medieval mass burial from the Old Hospital cemetery in Aalst, Belgium
25. Redfern, Rebecca: Living with the consequences of injury: a medieval perspective from London
26. Rios, Luis: Neuropathic arthropathy of the shoulder (Charcot shoulder): presentation of two cases in *H. sapiens* and *P. troglodytes*

27. Rios, Luis: Type A defect of the posterior synchondrosis in a juvenile Neandertal first cervical vertebra?
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35. Trancik, Viera: A possible case of Möller-Barlow disease from north-western Switzerland
36. Van De Vijver, Katrien: Study of palaeopathological lesions in lime burials from a medieval and post-medieval cemetery in Mechelen, Belgium
37. Van Der Merwe, A.e.: Virtual endocasts as a diagnostic tool for microcephaly
38. Vigano, Claudia: Protocol optimization to detect G6PD deficiency in ancient samples
39. Wasterlain, Sofia: Growth problems in a skeletal sample of children from the foundling wheel of Santa Casa da Misericórdia, Faro, Portugal (16th-19th centuries)
40. Wetschei, Corina: Brave new world of agriculture in Southern Scandinavia. Better health for everyone?!
41. Woo, Eun Jin: A probable case of mucopolysacchridosis in Medieval skeleton from South Korea
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ABSTRACTS

Salme II ship-grave: examples of edged weapon injuries

Allmäe, Raili: Institute of History, Tallinn University, Tallinn, Estonia

The second burial ship at Salme that was found on Saaremaa Island dated from the end of the Pre-Viking Age (650–750 AD). It was discovered during the scheduled investigations for 2010. The excavations on site were carried out during 2010–2012. The burial ship contained the skeletal remains of 34 people. The burials had been executed in a respectful way. The bodies had been placed in extended supine positions, and dismembered body parts had been laid down at anatomically correct positions. Most of buried men were equipped with swords and covered by shields. The animal bone remains in the grave indicated that a burial ritual had taken place (Peets et al., 2011, Peets et al., 2013). The state of preservation of the bone material from the Salme II burial ship varied to a great extent. The poor preservation of the bone tissue of some of the skeletons reduced the possibility to detect and diagnose skeletal pathologies such as perimortem injuries. Nevertheless, the preliminary results of the skeletal analyses showed various edged-weapon injuries on ten of the skeletons, six of them exhibited at least two of such lesions. Main injuries were slashes and stabs, most likely caused by swords. Six skeletons displayed arrowheads in a way suggesting perimortem injuries of soft tissue. During the presentation only some examples of multiple traumas will be discussed, since the analyses are still in progress.

References: Peets, J., Allmäe, R., Maldre, L., 2011. Archaeological investigations of a Pre-Viking Age burial boat in Salme village at Saaremaa. Arheoloogilised välitööd Eestis (Archeological fieldwork in Estonia), 2010, 29 - 48. Peets, J., Allmäe, R., Maldre, L. Saage, R., Tomek, T. Lõugas, L., 2013. Research results on the Salme ship burials in 2011-2012. Arheoloogilised välitööd Eestis (Archeological fieldwork in Estonia), 2012, 43 – 60.

Exploring Degenerative Joint Changes between and within age at death cohorts

Alves Cardoso, Francisca: CRIA - Centre for Research in Anthropology, Lisbon, Portugal

Degenerative Joint changes (DJC) are amongst the most studied and recorded changes in human skeletons. These are used to assess osteoarthritis (OA) in past populations studies (PPS) whilst testing patterns of activity, and are sometimes used to support age- at-death assessments. Given the association between OA and age, this paper explores OA within same aged individuals and between ten year age cohorts while controlling for sex. OA prevalence was tested in 77 Identified skeletons distributed in ten year age cohorts (from 20 to 80), with a minimum of 7 and maximum of 17 individuals. Females comprise 49% of the sample, with 54 years as mean age at death and males 51%, with mean age of 44. Only left articular surfaces of major joints (shoulder, elbow, hip and knee) were explored. The results showed a strong association with age and that OA frequency varied according to articulation, being predominate in the knee. Nevertheless, not all older (>50 years) individuals exhibited OA in all sites observed; and conversely, OA was also found in younger individuals (≤50years old). In the current sample OA association extends to sex since the females compose the older individuals of the sample. But this should not be confused with OA sex-specific association. Therefore, although an association between OA was found it was not exclusive to older individuals, nor sex, nor joints i.e. articular facets. Consequently, any studies that focus on DJC at articulations' sites must control for age, to prevent any bias in observation and interpretation. This precaution is extremely important to assess sex inequalities in past populations. The fact that OA was frequently encountered in individuals older than 50 represents a challenge in PPS since life expectancy was of low estimation.

Prisoners of war and perimortem fractures

Bäckström, Ylva, Department of Archaeology and Ancient History, Lund University; Ingvarsson-Sundström, Anne, Department of Archaeology and Ancient History, Classical Archaeology, Uppsala University & Museum Gustavianum, Uppsala University

Excavations of a 16th century mining community cemetery during the 2000s in central Sweden revealed differences in the spatial distribution of graves, burial customs and demography. Men, mainly younger men, were buried in earthen graves, often containing more than one body. They seem to have been buried in their everyday clothes and one of the men was buried with an iron collar still around his neck. The general impression is that these burials were carelessly done compared to the other group of graves, where the dead (women, men and children of different ages) were buried in wooden coffins, in many cases probably in burial shrouds. Signs of a difficult life can be seen in the prevalence of fractures. Almost a third of the men in the simple earth burials showed un-healed fractures compared to one percent in the coffin burials. Together with the man with an iron-collar, this pattern points towards two special social categories mentioned in the written sources: criminals and especially war prisoners. The strontium values for all earth burials are clustered around 0.712 (n=19) compared with "the locals" in coffins around .722 (n= 9). The vague remnants of a boundary between coffin burials and earth graves in parts of the burial ground would substantiate this interpretation; the war prisoners were not buried inside the "proper" churchyard together with the families from the mining village. Countries like Poland, Russia, Germany or perhaps Denmark, as a Danish coin was found in one of the earth graves, are likely candidates for the origins of such war prisoners according to written records.

The Impact of Industrialisation on Health in London: Understanding the Aetiology of Hyperostosis Frontalis Interna

Bekvalac, J, Museum of London; Western, A. G, Ossafreelance; Farmer, M, Lymington New Forest Hospital; Conlogue, J., Quinnipiac University, USA

Hyperostosis Frontalis Interna (HFI) is a pathological condition often observed and recorded on the endocranial surface of the frontal bone in human skeletal remains but its aetiology is still not fully understood. Clinical research has recently been carried out to investigate the possible contributory factors producing the bony response and to examine the relationship between HFI, age and sex. In modern populations, HFI is now being seen in greater numbers of patients, with present day studies indicating that the manifestation of HFI, particularly in females, may be linked to over-exposure of oestrogen and associated with the 'industrialisation' of society. As part of a preliminary study investigating HFI, crania of 18th -19th century individuals with biographical information from St Bride's Crypt, Fleet Street, London were examined macroscopically and using direct digital radiography (DDR). The aim of the study was twofold; firstly, to investigate HFI prevalence in an industrial population with regard to the demographic profile, longevity and parity in order to establish if they followed a similar pattern to that observed in modern populations; and secondly, to quantify the limitation of macroscopic examination by the completeness of crania. Age was a significant predictor of HFI at St. Bride's, where it followed the pattern of occurrence in modern populations and reflected the longevity of females. The results also highlighted the importance of the application of DDR when studying HFI in well preserved archaeological material with complete crania.

Cases of Head Manipulation in the Medieval Groups of Eurasian Nomads

Berezina, Natalia: Research Institute and Museum of Anthropology Lomonosov Moscow State Univercity, Moscow, Russia

The head has always attracted people's attention because it is identified with being a human. In ancient

times, people carried out different antemortem and postmortem manipulations of human heads, leaving traces on the skull. Besides ritual and other special manipulations of the head, there was also common or military trauma, all of which was connected with the belief that the head was representative of the entire body. That is one reason why enemies often struck the head. In our work we examine several cases of cranial vault damage in medieval nomads from southern Russia (forest-steppe zone and North Caucasus). Differential diagnoses for trauma and ritual manipulation were made with the help of microfocus x-ray, which provided an an informative picture with multiple zooming and no loss of image quality. The work was carried out with a Pardus-150 x-ray machine at the Research Institute and Museum of Anthropology at Lomonosov Moscow State University. A Digora system was used for image decoding.
Two skeletal collections were used for our work: the collection of D.G. Rokhlin stored in the Peter the Great Museum of Anthropology and Ethnography at the Russian Academy of Science (Sankt-Petersburg, Russia), and the cranial collection of the Research Institute and Museum of Anthropology at Lomonosov Moscow State University (Moscow, Russia). Two groups of skull vault damage were investigated. The first includes defects on the frontal and occipital bones where differential diagnoses distinguish sharp instrument strikes and trepanations made by scraping. The other group contains modifications of the cranial vault that, if they occur systematically in an ethnocultural community, can be considered as a tribal tradition of head manipulation, i.e. symbolic trepanations. If these defects occur randomly with regard to location and shape, we consider them as evidence of trauma.
This work is supported by Russian Fund of Fundamental Investigations, grant № 2-06-00009-a

The silence of the lambs. A paleoepidemiological approach for the identification of "murrain" in archaeological deposits

Binois, Annelise, Environmental Archaeology, Université de Paris 1 Panthéon-Sorbonne, Nanterre Cedex, France

"Murrain" and epizootic disease have undoubtedly been cause for animal mortality at least since the advent of animal domestication and have therefore represented a major concern for agro-pastoral societies for just as long. These mass animal mortalities, however, seem almost absent from the archaeological record. Our research focuses on developing an interpretative framework for the understanding of animal carcass accumulations, in order to evidence the existence of epizootic animal mortalities in archaeological sites and to suggest diagnostic hypotheses as to the cause of death involved. This presentation, based on several case studies of ovine mortalities, exposes the methodology we have adopted and demonstrates that when rigorously conducted, a paleoepidemiological approach based on the cross-referencing of bio-archaeological data and of medical historical sources can lead to the probable identification of pathogens involved in archaeological animal mortalities.

From the womb to the tomb. A medieval case of maternal and foetal mortality following a dystocic calving

Binois, Annelise, Environmental Archaeology, Université de Paris 1 Panthéon-Sorbonne, Nanterre Cedex, France

This poster presents an archaeological case of dystocic calving having led to the death of both cow and calf. The two animals were found buried together in a single pit on the medieval site of Téteghem-Carlines 3 in northern France, excavated in 2012. The location of the foetal skeleton, wedged in the maternal pelvic canal, leaves little doubt to the cause of both deaths, and the examination of the foetal positioning allows us to diagnose a foetal malposition as the origin of the dystocia. We describe the exact nature of the malposition and discuss the medical options that could have been used to bring about a happier conclusion to the calving. Although dystocia was probably not an uncommon cause of death in

archaeological cattle, similar cases are exceedingly rare in the archaeological record. A single other occurrence appears to have been described, on the British Iron Age site of Gussage All Saints , and is presented here. These two cases offer a vivid and touching picture of animal life and death in early farms, and provide valuable information on obstetric knowledge and practices in ancient times.
References: Harcourt, R. (1979) - The animal bones. In G. J. Wainwright (ed.), Gussage All Saints, an Iron Age settlement in Dorset. Department of the Environment Archaeology Reports, No.10, pp. 150-160.

Analyses of Mycobacterium tuberculosis genomes from the pre-contact New World using high throughput sequencing

Bos, Kirsten, Department of Archeological Sciences, University of Tuebingen, Tuebingen, Germany, Kelly M. Harkins, Alexander Herbig, Jane E. Buikstra, Sebastien Gagneux, Anne C. Stone, and Johannes Krause

The success of DNA capture as applied to ancient pathogens suggests these techniques would be highly suitable for addressing outstanding questions regarding the evolutionary history of many infectious diseases. A long-standing question in paleopathology, for example, has been the phylogenetic placement of putative Mycobacterium tuberculosis strains from the pre-contact New World. Comparative genomics of modern isolates indicate that M. tuberculosis from North and South America are most closely related to those of European origin; this observation, however, is incompatible with popular models of tuberculosis history, which imply its worldwide distribution via human migrations during the Pleistocene. Here we report on three complete Mycobacterium tuberculosis genomes from South American pre-Columbian skeletal material using DNA capture and high throughput sequencing. Our results will be discussed within a phylogenetic and phylogeographic framework, addressing theories on pre-contact mycobacterial infections in the New World, and the evolution in general of the Mycobacterium tuberculosis complex.

Brawls, falls and musket-balls: trauma patterning in 18th - early 19th century sailors of the British Royal Navy

Boston, Ceridwen, Research Laboratory for Archaeology and the History of Art, University of Oxford, Wantage, United Kingdom

The opportunity to examine the physical effects of a specific lifestyle or occupation occurs but rarely in osteoarchaeology, and is of considerable value in unpicking the influence of the environment on the human body. This paper examines the effect of a maritime lifestyle on trauma patterning, through the analysis of 300 skeletons excavated from the burial grounds of three British Royal Navy (R.N.) hospitals: the Royal Hospitals Haslar, Plymouth, and Greenwich (1748- 1856). They comprised common seamen of the R.N., who sailed and fought in the many conflicts in which Britain was engaged in this period. The theatre of war was global, with many seamen spending long periods at sea, often on foreign stations. Naval physicians of the era agreed that sailing a fighting ship was an extremely hazardous occupation. This is borne out by osteological analysis of the above skeletons, which display extraordinary rates of bony trauma, including over 900 fractures and dislocations. Using modern and forensic trauma analysis and documentary evidence, this paper explores most probable aetiologies of these fractures, based on fracture distribution and type observed in the three R.N. assemblages. Although battle trauma was undoubtedly present, the majority of injuries were probably incurred in the everyday activities aboard ship, including falls, crush injuries and brawling. There are also clusters of several unusual fractures, such as metacarpal-III styloid avulsions, acetabular rim fractures, joint surface crushing and flange lesions, patellar fractures and Shepherd's fractures of the talus. These distributions tentatively suggest an occupational trauma patterning peculiar to seafarers in the Age of Sail.

'Boys...and girls.... point toes': occupation and Shepherd's fractures in two archaeological populations

Boston, Ceridwen, Research Laboratory for Archaeology and the History of Art, University of Oxford, Wantage, United Kingdom; Sinnott, Catherine, Forensic Institute, Cranfield University, Shrivenham, United Kingdom.

Shepherd's fractures or fractures of the medial tubercle of the posterior process of the talus are rarely reported in either the modern medical or osteoarchaeological literature. The eponomous fracture occurs during forceful hyperplantar flexion or forced inversion of the foot (Judd and Kim 2002), in which the posterior process is crushed between the distal tibial and the calcaneus. Colloquially known as 'nutcracker fractures', these fractures have been recognised in modern ballet dancers, basketball players and footballers (Hillier et al. 2004). This study suggests two more occupations associated with Shepherd's fractures, namely 18th-19th century male sailors and 19th century female weavers. Three hundred skeletons of seamen of the British Royal Navy revealed 49 Shepherd's fractures (6.3% of skeletons, or 2.7 of tali present). The aetiology of this fracture is unclear, but one possible mechanism of injury may have involved sailors working aloft in the rigging. Sailors, precariously balancing on rope stirrups beneath the yards, may have needed to forcefully point their toes to maintain their balance during a swell, resulting in a Shepherd's fracture. A high prevalence of Shepherd's fractures was also observed in 19th century female skeletons from Darwen, Lancashire. Of 62 adult skeletons, seven displayed Shepherd's fractures (11.3%). All but one was female.

Weaving was the predominant industry in the town, with most men working in mechanized cotton mills, whilst many females still operated more traditional handlooms in their homes. Handlooms of the period were foot-operated, and the high prevalence of Shepherd's fractures in the females of this assemblage suggests a fatigue fracture from repeated plantar-flexion operating this machinery.

References: Hillier J, Peace K, Hulme A, and Healy J. 2004. MRI features of foot and ankle injuries in ballet dancers. The British Journal of Radiology 77:532-537. Judd DB, and Kim DH. 2002. Foot fractures frequently misdiagnosed as ankle sprains. American Family Physician 66(5):785-794.

Health status of late 19th and early 20th century Khoesan

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Since the arrival of the Dutch colonists in the Cape, Khoesan populations were subjected to severe political and economical marginalization and often fell prey to racial conflict and genocide. These circumstances persisted until the early 20th century, during which an astonishing number of Khoesan skeletons were transported from South Africa to various locations in Europe, as at the time, different institutions competed to obtain these valuable remains. Due such circumstances, southern African Khoesan groups suffered from nutritional stress, as well as substandard living conditions. Skeletal remains housed in two different European institutions were studied. The sample comprises of 140 specimens from the Rudolf Pöch Skeletal Collection in Vienna, Austria and 15 specimens from the Museé de l'Homme in Paris, France. These individuals represented both sexes and were aged between newborn and 75 years, with 54 individuals being younger than 20 years of age and 101 being adults. The aim was to analyse all skeletal lesions. Results indicated high levels of typical disease conditions associated with groups under stress, such as periostitis, cribra orbitalia and porotic hyperostosis. Treponemal disease, rickets, osteoarthritis and trauma were also encountered amongst other more specific indicators of health and disease. This study provided additional knowledge on the health status and lives of the Khoesan people during the turn of the 20th century, as well as focused new awareness on a group of severely mistreated individuals.

A challenging diagnosis – Sct. Birgittes Chapel A 171 a case study

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During the excavation of the Sct. Birgittes Chapel, Roskilde Cathedral, Denmark, dated to the Medieval period (AD 1000-1536), 41 skeletons were recovered. During the osteological analysis one individual revealed extensive pathological changes of particular interest. This was a c. 18-month-old child (A 171). Each bone of this child was affected by different degrees of severity of lytic lesions, bone porosities, plaque formations of woven and compact bone. The long bones, pelvic bones, scapulae, ribs, vertebrae, and clavicles are all characterized by diffused patterns of cortical bone resorption exposing the trabecular structures. The edges of the lytic areas show evidence of sclerotic reaction. In addition, porotic hyperostosis is evident both endo- and ectocranially, affecting all vault bones. However, the most severe lesions on the skull are located on the frontal bone where extensive sunburst lesions are observed in eye orbits, surrounding areas and on the sphenoid. The maxilla and mandible show the same periosteal reaction as the long bones and the palate is characterized by diffused porosities and active periostitis. The CT scans of the skeleton reveal a secondary bone layer surrounding both ilia the diaphysis of the left femur. The pathological alterations and the age of death may indicate a diagnosis megaloblastic anaemia or leukemia.

Inquiring into the Medieval Plagues

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Exactly 120 years ago, in 1894, Alexander Yersin published the first paper about the causative agent of plague, *Pasturella pestis* - later called *Yersinia pestis* in his honor. Yersin was also convinced that the bacterium was responsive for the historical pandemics, the first pandemic, started with the Justinian plague (6^{th} – 7^{th} centuries), and the second one, started with the Black Death (14^{th} – 18^{th} centuries). But some historians and other scientists were skeptical: Discrepancies in the description of symptoms, in the rapidity of spread and in the modalities of contagion accounted for several doubts about the etiology of the past "pestilences". In the last few years, new investigations on putative plague victims of the past by means of ancient DNA (aDNA) analyses have settled the debate by confirming that *Y. pestis* caused also the plagues of the past. These works have enabled a deeper insight into the genome and the phylogeny of the ancient plague pathogens and allow inferences about their nature, their differences, their genetic and geographical relationships and the place of evolution. Nevertheless, incongruences still persist regarding the modalities of transmission that do not fit perfectly with those described by Paul Louis Simond during an outbreak in India at the end of the 19th c.

The past routes of dissemination through the continents, the implication of wild and anthropochorous fauna in Medieval times and the interplay between climatic conditions and plague dynamics are still debated. With a new ERC-Advanced Grant (MedPlag. The medieval plagues: ecology, transmission modalities and routes of the infections) we are trying to give an answer to all these open questions about the historical pestilences with interdisciplinary studies involving ancient DNA, climatology, ecology, and history.

Developmental Conditions at Stirling Castle

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Stirling Castle was one of the key garrisons of the Scottish Wars of Independence, 1296-1328 and 1332-1357AD. In 1997, excavations at Stirling Castle revealed a lost royal chapel and nine burials that were radiocarbon dated to the 14th and early 15th centuries. The abundance of peri-mortem trauma within this group has been reported on previously. A wide range of developmental conditions were present

within this small population. These include thoraco-lumbar, lumbo-sacral and sacro-coccygeal vertebral shifts, cleft neural arch of C1 and scoliosis. In addition, one individual displayed an absent styloid process of the left ulna and a bipartite left scaphoid. Both of these abnormalities in the wrist could represent healed non-union fractures; however the lack of any evidence of callus formation on either bone and the smooth nature of the pseudoarthrosis make a diagnosis of developmental variants of the wrist more likely. In total, five individuals (55.5%) had at least one developmental variant. Once levels of preservation and completeness are considered, true prevalence rates for each condition ranged from 25-100%. The high prevalence of developmental variants suggests the population excavated at Stirling had a small gene pool and is, perhaps, indicative of marriage patterns in medieval elite populations.

Skeletal evidence for a prehistoric metabolic syndrome: Diffuse idiopathic skeletal hyperostosis and gout in a 3000-year-old Pacific Island skeletal assemblage

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The modern Polynesians have the highest prevalence of metabolic syndrome related diseases in the world. A genetic predisposition for hyperinsulinaemia and hyperuricaemia has been proposed as contributing to this epidemiological pattern. Here we compare dietary isotope values with the presence of skeletal indicators of diffuse idiopathic skeletal hyperostosis (DISH) and gout in an early prehistoric Pacific Island skeletal assemblage in order to evaluate risk factors for the development of these conditions in the past. More broadly, we aim to contribute to the understanding of the development of modern metabolic syndrome by considering its prehistoric analogue.

The skeletons of thirty-five individuals from the 3000-year-old assemblage of Teouma, Vanuatu were assessed for the presence of proliferative and erosive skeletal modifications indicative of DISH and gout. Statistical analyses show there was a significant relationship between DISH and gout and there was a relationship between the two conditions and stable isotope ratios of carbon and nitrogen. A statistically significant relationship was observed between the presence of DISH and gout. When sexes were considered separately this relationship was significant for males only. There was no difference in the mean carbon or nitrogen stable isotope values between individuals with and without DISH or gout. The presence of a positive relationship between DISH and gout and absence of a positive relationship with dietary isotopes suggests that while DISH and gout have a common causative factor, that factor is not individual access to dietary resources. Most likely, individual genetic factors interacted with the environmental conditions in place during the colonization process to produce a pattern of skeletal change that could be considered a prehistoric variant of the metabolic syndrome.

Post-traumatic signs of blunt trauma of the skull of the Upper Paleolithic man from Kostenki XIV, Russia

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The Markina Gora (Kostenki XIV) skeleton was discovered in 1954 by Rogachev in a pit of oval form at the site of Kostenki, European Russia (Rogachev, 1955). Direct dating of the human remains by accelerator mass spectrometry (AMS) yielded an age of 33,250±500 yBP (Marom et al., 2012). The skeleton was found lying on its left side in an extreme crouched position. The skull was oriented face down, and both hands seemed to be connected to the mandible. The bottom of the pit, the skeleton, and especially the skull, were covered with red ochre (Rogachev, 1955). The red ochre covering as well as the unusual position suggests an intentional burial. The sex of the individual was determined to be male and age at death was estimated according to the teeth and cranial suture closure to be young adult. The

analysis of pathological features of the skeleton confirms degeneration of the bodies of two lumbar vertebrae. This could be the result of spinal trauma. In addition, two healed injuries of a skull were noted. Computed tomography (CT) was used as a method of investigation to explore the characteristics of the skull lesions. As a result, it was possible to record post-traumatic signs, such as intracranial calcified hemorrhaging in the right parietal area and a large osteomyelitic lesion in the fronto-parietal part of the skull. Intracranial hemorrhaging may be caused by any blunt trauma, due to a fall, or any accident. The trauma is discussed both in the context of normal everyday life, and as part of the funeral ceremony incorporating the presence of red ochre inside the skull of the man.
The research was supported by grant of RFBR #13-06-12035
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MedMAX – A new possibility for synchrotron radiation imaging in paleopathology?

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The new Swedish synchrotron radiation facility, Max IV, which is currently under construction in Lund, will have state-of-the-art performance for the production of x-rays with optimal characteristics in a wide energy region. The beam will have extremely high coherence, which makes it particularly well suited for imaging. A dedicated beamline for biomedical imaging, MedMAX, will provide very powerful techniques, complementary to conventional x-ray imaging. Phase-contrast imaging offers excellent soft-tissue contrast and unique qualities for bone and cartilage imaging, while spectroscopic techniques allow for quantitative imaging of specific elements and molecules. In both cases, 3D tomographic methods can be applied on large objects with very high resolution. This talk will give an overview of synchrotron radiation imaging techniques that will be available at MedMAX, and how it can be used in biomedical research, in particular for studies on bone and cartilage. Examples will be given from studies on the development and growth of bones and cartilage in infants and young people, the development and potential reversal of arthritis, and the degeneration in an aging population. These imaging techniques have proven to be useful also in biological archaeology, and some examples will be given from paleopathological research.

A model of violence: Archaeology and bioarchaeology in prehistory

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The past is often used as a guideline, a measuring stick, for mapping, predicting, or simply understanding human behavior in the present. One of the greatest difficulties in studying violence in the past is determining how to place violence in a definitive role in the daily life of an individual or society. While violence and warfare leave recognizable patterns in the archaeological (material) record, skeletal trauma can be created by a variety of situations (Bennike 2008; Walker 2001). I propose to look at the relationship between trauma and violence through a model that contextualizes potential fluctuations in the frequency of trauma over time. This model is not intended to govern the direction of research on trauma. Instead, it is a heuristic model designed to provide a basis for further hypothesis development regarding violence-related trauma. Prescriptive modeling aids in the interpretation of complex systems, like cultural and social orders, by providing an illustration, or prediction, of how data may present under specified conditions (Meyer 2004). The model highlights the frequency of trauma in specific trends of violence and how that frequency may change over time. The aim of the model is to produce a flexible way to examine the frequency and pattern of trauma and its relationship to violence in prehistory. The model

provides a framework to place within a cultural context. It also integrates archaeological evidence with violence and adjusts the patterns (peaks and troughs) for an expected level of trauma frequency that can then be used to examine the bioarchaeological evidence for violence within a skeletal collection. This model creates a more nuanced understanding of the use or production of, and engagement in, violence and violent practices.

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Clinoid Bridging and Developmental Pathology: an Example from Indiana

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Physical anthropologists consider clinoid bridges a normal anatomical variant rather than an indicator of pathology. Clinoid bridges exhibit considerable variability across human populations, and have been incorporated in biological distance studies.

However, extensive clinoid bridging is reported in several developmental syndromes, including Axenfeld-Rieger Syndrome, Pascual- Castroviejo Syndrome, and Osteogenesis Imperfecta. An adolescent male from the Late Prehistoric Murphy Site in southern Indiana, 12Po1-1, exhibits massive clinoid bridges associated with small regions of premature suture closure. Dental and skeletal developments are discrepant: the third molar roots are nearly fully formed, whereas the sphenoccipital synchondrosis is open, and epiphyseal fusion is consistent with a much younger age. Features characteristic of the syndromes listed above are absent, but there are subtle anomalies of cranial and dental morphology in several of these features. In his work on dental agenesis and developmental timing, Stanley Garn argued for a threshold model of discrete variation. If his model is generalized, it places the abnormal or the pathological at the ends of the normal distribution of morphological features. Developmental features in 12Po1-1 suggest delay and ill health at the threshold of adult life. Since mortality rates are at their lowest between 5 and 20 years of age, this is the cohort in which we might expect to see mortality associated with disorders of development. Mortuary practices suggest that this young man was a valued member of his community, perhaps indicating that his condition did not include behavioral deficits.

Thanks to Cheryl A. Munson for access to this interesting person and assistance with documentation and photography.

A high throughput approach to genotype ancient parasite remains

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Paleoparasitology, i.e., the study of parasite remains (eggs, macro-remains, antigens, DNA) in archaeological samples, is important to investigate the health status of past populations. While taxonomic identification by microscopic observations of egg features has been intensively developed during the 20th century the field still lacks serious genetic studies. The development of next generation sequencing (NGS) boosted the field of palaeogenetics and allowed sequencing of entire ancient genomes. Palaeogenomics, has since then become an important new tool in evolutionary studies. The analysis of ancient genomes, however, is still challenging. We developed an approach for the genotyping of

archaeological specimens called “a Plex Torrent”, which combines the specificity and sensitivity of PCR with NGS. This approach was adapted to the study of parasite genome traces in ancient human faeces preserved as sediments. In particular, we genotype gastro-intestinal helminthes such as *Taenia saginata*, *T. solium*, *T. asiatica*, *Trichuris trichiura*, *Dicrocoelium dendriticum*, that had infected humans, simultaneously in up to 96 samples. Our results show that genetic and microscopic approaches are complementary, since using the aMPlex Torrent approach we can identify the presence of parasite species from ancient organic samples even when eggs have not been observed.

Perinatal deaths in the «Ermida do Espírito Santo» (Almada, Portugal): between affection and marginalization

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An extensive overhaul of the «Ermida do Espírito Santo» (Almada, Portugal), sponsored by the Almada City Council, allowed the full archaeological excavation of the abandoned church (16th – 19th centuries). The skeletal remains of 88 individuals were recovered, of which 12 (13.6%) were non-adults. This study aims to present six individuals deceased during the perinatal period and inhumed at the «Ermida». Five of the individuals were dorsally deposited, and oriented in harmony with the overwhelming majority of the congregation (S-N); two were buried in the arms of their presumed mothers (resembling a «cradling» position), two were interred outside the church’s nave, and one was buried in the narthex, contiguous to the doorway. Finally, a perinatal individual was interred in ventral position, in an unorthodox SE-NO orientation, suggesting a non-ritualized disposal. Perinatal and neonatal deaths, obstetric deaths of both mother and child, and the dissimilar mortuary treatment of perinatal deceased individuals – ranging from social remembrance and attachment in the case of the apparent mother-child double burials, and the apparent marginalization of the other individuals – in the «Ermida do Espírito Santo», will be discussed in a biocultural framework.

Women and Non-Adults aboard Warships in the 16th and 17th Centuries

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Women have always been part of military campaigns, as camp followers, sutlers, wives, and occasionally as soldiers. Warships did not officially exclude women until the early 19th century: "Women were a normal part of European armies at least from the 14th until well into the 19th centuries" (Hacker 1981: 643). Skeletal material from the 16th century English warship Mary Rose and the 17th century Swedish warship Kronan are examined for female traits. In the aftermath of both disasters, remains from those on board became intermingled, with bones best considered as isolated elements; however, os coxae, sacra and lumbar vertebrae that articulate firmly are considered to be from one individual. In addition, skeletal elements are not comprised of random remains drawn from a medieval cemetery in use for generations: female bones could only be from females on board. On the Mary Rose, two and possibly three different individuals are ambiguous, based on os coxae and selected long bone diameters. On the Kronan, two pelves are from probable females, although remains from at least five nonadults at or younger than age 6-8 years provide the biggest surprise.

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Rib lesions and other signs of infectious in non-adults from the medieval necropolis associated with the São Martinho Church (Leiria, Portugal)

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The area of the former São Martinho church (ca. 13th-16th centuries AD), in Leira town, was excavated in 2000/1. During the fieldwork 157 skeletons and numerous commingled bones were exhumed. The individuals in articulation were studied (Garcia, 2007) and this study aims to discuss the differential diagnosis of the conditions behind the lesions visible in the non-adults. Of the 63 individuals with the age at death between birth and 18 years, 6 (9.5%) present ribs with new bone formation. In this group, one child has an osteolytic lesion in the mandible and another shows exuberant bone reactions of the limbs and vertebrae. Enlargement of hand phalanges is noted amongst the pathological lesions visible in these individuals. In addition to the macroscopic evaluation, a radiological examination was also performed of several bones. Although a nonspecific trait, an unusually high presence of lesions in the ribs is noted in these non- adults. The lesions on the axis and appendicular skeletal allowed the identification of probable cases of tuberculosis. Differential diagnosis was performed with respect to other conditions reported in this group of non-adults. This study added evidence of infectious diseases to the paleopathological record of a Portuguese medieval urban population.

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Skeletal manifestations of stress in child victims of the Great Irish Famine (1845–52): Prevalence of enamel hypoplasia, Harris lines and growth retardation

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The Great Irish Famine of 1845–52 is among the worst food crises in human history. While numerous aspects of this period have been studied by generations of scholars, relatively little attention has so far been given to the physiological impact it is likely to have had on the people who suffered and succumbed to it. This study examines the prevalence of enamel hypoplasia, Harris lines and growth retardation in the non-adult proportion of a skeletal population comprising victims of the Famine who died in the workhouse in the city of Kilkenny between 1847 and 1851. The frequency of enamel hypoplasia in these children does not appear to have increased as a consequence of famine, although this fact is likely to be a reflection of the osteological paradox. Harris lines and growth retardation, however, were very prevalent, and the manifestation and age-specific distribution of these may be indicators of the Famine experience. While there was no clear correlation in the occurrence of the assessed markers, the presence of cribra orbitalia displayed a weak but significant relationship to enamel hypoplasia in 1–5 year old children. While starvation, metabolic disorders and infectious diseases are likely to have greatly contributed to the manifestation of the markers, the psychosocial stress relating to institutionalization in the workhouse should not be underestimated as a substantial causative factor for skeletal stress in this population.

Plagiocephaly and Torticollis of three Individuals from a Kurgan (Scythian Period) in Majemer, Kazakhstan

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In Majemer, Kazakhstan, archaeological research revealed seven inhumations out of a Kurgan, which belongs to the Scythian period (4th - 2nd century BC). Three out of seven skeletons show morphological

changes on the skull. The length, size and position of the mastoid process is divergent and indicate different lengths and strength of the sternocleidomastoideus muscle. Additionally, the cranial base shows an enlarged occipital bone unilaterally and different shaped occipital condyles. This picture is associated with torticollis, which includes deformational plagiocephaly. There are many reasons for this pathology, which will be discussed in the poster. It may be congenital, with the bony transformation being an adjustment to the condition over a long duration. Another reason can be a rheumatic disease, which is not diagnosed on the skeletons.
Also an osseous deformity of the vertebral bones has to be excluded. It is remarkable that three out of seven individuals have this evidence and the remaining DNA-examination will clarify, whether this Kurgan-group shows a genetic disposition to the condition.

Surgical manipulations in the process of mummification: Post-mortem symphysiotomy repair of the pelvic bone of a mummified woman in tomb TT16 (Panhesi Tomb; Thebas Tomb; Luxor, Egypt)

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The Rameside tomb of Panhesi (TT 16) is located in Dra Abu El-Naga (Luxor West Bank). Abundant human remains were found in this passage. These human remains are the consequence of the continuous reuse of the tomb for intrusion burials for over 1000 years of the more than 3000 years of the tomb's history. During the 2011, 2012 and 2013 season, the first 15 meters of the passage yielded a great quantity of remains, mostly human, and anthropologic and paleopathologic studies were performed. Among the exhumed human remains we found samples of several important post-mortem surgical procedures that the embalmers performed with great precision and care to preserve the physical integrity of the individual. This was achieved either by careful extraction of the brain through the nose through an opening in the lamina cribrosa of the ethmoids and also with meticulous abdominal incisions for the extraction of the abdominal and thoracic viscera. However, one of the most striking finding was the pelvic bones in a young woman with the pubis united by a suture performed with a rope that was embedded in resin and placed to reconstruct the normal anatomical position. We believe that the suturing was performed as a post-mortem symphysiotomy repair. To explain this surgical maneuver we believe that dystocia of the fetus most likely caused labor arrest with fetal retention in the pelvis and was probably the cause of death for the mother and child. The extraction of the fetus demanded the widening of the delivery channel through a cut in the ligaments of the symphys pubis. It appears that the suture was placed from the abdominal cavity, once empty and the fetus was extracted. This is the first report of an obstetric procedure performed during the process of mummification that we are aware.

Parietal thinning, comparative radiological study of 6 cases, one from ancient Egypt and five from Spain (XVI Century)

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Bilateral thinning of the parietal bones is a disease described in the eighteenth century. Although there is still no consensus in terms of its etiology. Some have considered it an anatomical variant or a non-

progressive congenital dysplasia of the diploë, others think it's an acquired and progressive disease, some associate it with senility, or osteoporosis, others blame growth defects or even constant pressure on this area of the skull as its cause, and finally, there are researchers that relate it to acute inflammatory atrophy associated with trauma, primary and metastatic tumors, the Gorham-Stout disease, diabetes mellitus, and, in actual clinic practice, a prolonged steroid therapy. We would like to present 6 cases from two necropolises, quite separated in time and space, but with common features of the disease on the affected individuals. One of cases is from a sample of 95 adult skulls found in the tomb of Momthemhat (Luxor, Egypt), in the time frame between the I and II century AD. The other five cases are from the seventeenth- century necropolis excavated in the Claustro del Infante Don Juan Manuel (Belmonte, Spain). In this necropolis 84 individuals have been exhumed; 68 females, 6 males and 10 indeterminated, all aged from 15 to 60 years of age. Documentation of that period indicates that mostly nuns were buried in that cloister. Radiography was performed on all the cases from both necropolises in order to establish the correct diagnosis. Of the six cases 5 were women and one was a man. All of them were between 45 and 50 years of age.

Dental disease in a high-status post-medieval population from Ambel, Zaragoza, north-east Spain

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In 2007, 41 individuals were excavated from the Iglesia Parroquial de San Miguel de Ambel, dating to the 16th- 18th century CE (Blanco Morte 2007). These burials were located in the nave of the church, in proximity to the altar major, indicating the high social status of the deceased. San Miguel is associated with the preceptory of the Knights Hospitallers who were based in Ambel since the 14th century (Gerrard 1999). Textual evidence attests the burials of at least one of the Order's Commanders and the infant nephew of one of the commanders near the High Altar. This presentation aims to assess the prevalence of dental caries, periapical lesions and ante-mortem tooth loss (AMTL) using macroscopic methods. We hypothesize that these high status individuals would have had access to a diet high in carbohydrates and especially sugars, thus leading to a higher prevalence of tooth decay, dental infection and subsequent AMTL when compared to contemporaneous skeletal populations of different social status (Lopez et al. 2012). A total of 27 individuals had at least one tooth and/or alveolar socket preserved. Of these three were non-adults (under the age of 18 years), nine were female and 15 male. Despite an even distribution of younger (18-35 years) and older (35+) individuals in the adult sample, all but one had AMTL, periapical lesions or dental caries. AMTL was the most prevalent condition with 16 adults (67%) having lost at least one tooth during life and several individuals were completely edentulous. In contrast, dental disease rates for other Spanish samples were lower and our findings will be discussedtaking contextual information such as textual references to food provisions available to the individuals living in Ambel into consideration (Gerrard and Gutiérrez 2003).

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Manual segmentation and visualization of the gastrointestinal tract of a 17th century Korean general

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We present the results of performing virtual morphometry in order to clarify and corroborate to previous CT-imaging and post-factum dissection in a Korean mummy. The mummy dates back to the 17th century, and is one of several Korean mummy finds, notable for their extraordinary preservation [1]. The mummy was scanned at the Dept. of Radiology, Dankook University Hospital, Korea. Using the computer program Mimics, we made image segmentation, 3D visualization, and volumetric estimation of eventual remains in the GI lumen. Further, we investigated the mean HU value of the lumen material and the intestine wall. Finally, we tried to estimate the time between the last meal and time of death. We were able to isolated several parts of the GI tract, most likely to be cecum, the descending colon, the sigmoid colon and the rectum. These parts of the GI tract was dilated and filled with some material, most likely to be feces. The total amount of lumen material was approximately 62 cm3. The mean HU values of the material inside the GI tract and the intestine wall suggested that there was a different HU profile for the two types of soft tissue. Thus, what was thought to be feces in fact was intestine content and not collapsed intestine wall. Finally, recent research has shown that the whole gut transit time is about 28-31 hours [2-4]. Due to the slice-by-slice segmentation of the GI tract, which revealed feces in the lower GI tract, and the more exact motility measurements available today, it is most likely that the Korean general's last meal was 25-35 hours before his death. Thus his death cannot be explained by an acute fracture of the mandible. This study is an example of the many advantages of the image segmentation and 3D visualization when investigating ancient and fragile mummies.

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Oral pathologies and dental modification from 19th century enslaved Africans

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During the British suppression of the Trans-Atlantic slave trade in the mid-19th century the small, south Atlantic island of St Helena played a critical role. Over 26,000 'liberated Africans' were received on the island, recovered from captured slave ships and liberated by the British Navy. Recent excavation on the island revealed remains of 325 victims of this trade, who died as a result of their forced transport across the Atlantic in appalling conditions. Osteological analysis of this population has revealed a) the largest assemblage of African dental modification found in an archaeological context and b) a host of pathologies, notably oral pathologies. In this study, we have analysed these dental modifications and their relation to dental abscesses and premortem tooth loss. In addition, to further understand the aetiology of these oral pathologies, we have applied ancient DNA and ancient protein analysis to dental

calculus, revealing some of the specific oral pathogens responsible for these infections. By using conventional and novel approaches we hope to illuminate the life-ways of this unique group of people, and improve our knowledge of origins, cultural practices and health of enslaved Africans in the 19th century.

Diet and health during the Industrial Period in Copenhagen

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Diet plays a significant role on our health and lifestyle. Based on the anthropological and stable isotopic analysis of the skeletal material from the Assistens cemetery, Copenhagen (n=854) an investigation of diet and health during the 19th and 20th Century is currently being conducted. The remains were analysed during the excavations for a new Metro station lead by Copenhagen Museum. Whether an absence or presence of certain diseases can in fact be reflected in the isotopic signal will not only provide important new information to our understanding on the relation between health and diet in the light of cultural and technological innovations during this period, but is indeed also relevant for the understanding of present day diet and lifestyle diseases. In this light, the results will add new anthropological information to a time period which is historically well documented. Preliminary results will be presented here.

Life and death of Children at Čerina: Bioanthropological analysis of young children remains from Josipovac-Čerina site, Croatia

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Site of Josipovac- Čerina is located near Osijek in eastern Croatia. It was excavated during summer of 2013 as part of rescue exavation due to construction of eastern European C-5 motorway corridor. Part of the cemetery was unearthed during that period - total of 291 graves. Almost half of the them (122) were young children and subadults; there is 6 double – mother / child grave as well. Aim of this work is to show most common condition and causes of death in children form Čerina and to present overall bioanthropological analysis of children skeletons since site is new in Croatian archaeology and was not located during preliminary survey investigations nither and there is very little historical or archeological data about that area as well. On the other hand to show living conditions and presence of subadult stress on children skeletal material in the first place and their direct relatives in rural environment during beginning (1525) of Ottoman occupation in the eastern part of continental Croatia.

Most of the children are under 5 years of age at the time of death and most of them show signs of subadult stress (Cribra orbitalia) almost in all cases in active form, traces of ectocranial porosity (Šlaus 2006) . On almost all children with their permanent teeth dental enamel hypoplasia was noted (Šlaus 2006).

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Skeletal Abnormalities observed in an adult from Early Medieval Poland: Is this a rare Archaeological Case of Down Syndrome?

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A male skeleton (35-45 years old) in the Giecz Collection (11-12th c), exhibits abnormal cranial and postcranial morphology, some of which is consistent with that observed in Down Syndrome (DS). This skeleton is below average in stature for males in this population and exhibits nasal hypoplasia (possibly

unilateral nasal aplasia), extraordinarily wide interorbital breadth, a short occipital chord, and unusual morphology in the axial skeleton, hands, and feet. DS is most often the result of Trisomy 21, a congenital abnormality typically occurring by meiotic nondisjunction during oocyte formation resulting in an extra copy of chromosome 21. During embryonic development, the extra chromosome is replicated in every cell of the body. DS hinders skeletal growth and results in craniofacial abnormalities, shortened limbs, small ears, and a flattened face. DS is often associated with mental retardation, heart conditions, leukemia, and infections. One of the greatest risk factors for DS is advanced maternal age, particularly after age 35 (Sadler 2012). A description of DS was first published in 1866 by English physician John Langdon Down. Later in 1959, French physician Jérôme Lejeune identified it as a chromosomal disorder. Although artifacts (paintings and figurines) have been interpreted to depict the syndrome in antiquity, it has rarely been reported for archaeological skeletal remains, and most of these cases are children (Berg and Korossy 2001). DS is rarely described in popular paleopathology reference texts (Aufderheide and Rodríguez-Marín 1998; Roberts and Manchester 2001). This poster presents a description of skeletal anomalies observed in an early medieval Polish skeleton and offers a differential diagnosis.
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Archaeoparasitology in Lithuania

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Archaeoparasitology is a rapidly developing branch of palaeopathology. It helps to reconstruct the lifestyles of past populations, providing information about human- parasite interactions, sanitation, hygiene and migration. The purpose of this study was to isolate, identify and examine endoparasite eggs and remains of ectoparasites from two medieval cemeteries in Lithuania (in Vilnius, Bokšto str., 3th-14th c.c., and rural, Paūdronys, 4th-15th c.c.), 16th-17th c.c. latrines and hygienic utensils of the Palace of the Grand Dukes and the Napoleon's Grand Army mass grave (December) in Vilnius. In soil samples taken from pelvic areas, eggs of Ascaris and Trichuris/Capillaria were found in Bokšto str., only Ascaris– in Paūdronys. Latrine contents from the Palace of the Grand Dukes had high concentrations of Ascaris, Trichuris and Diphyllobothrium eggs. These finds are similar to other analyses performed in the area of the Eastern Baltics, indicating endemic character of infestation. Mass grave of Napoleonic soldiers showed evidence of Schistosoma haematobium eggs, suggesting initial infestation in southern areas (probably those were remains of a veteran of Napoleon‘s Egypt campaign). Concerning ectoparasites, vestiges of chitin exoskeletons of Pediculus humanus were found on a comb from the Palace and with skeletal remains of Napoleonic soldiers. The last fact correlates well with historical evidences indicating massive pediculosis in Lithuania in Late Medieval – Early Modern times.

Button Osteoma Cases found in Joseon Dynasty Human Sample Collection of Korea

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Benign bone-forming neoplasms are considered as osteoma, osteoid osteoma, osteoblastoma, osteosarcoma and osteochondroma. There are reports of commonly occurring benign neoplasms in human remains concerned with geographic regions though few such cases have been reported in Asia. In this study, benign bone tumors were found in two skeletons (case 75 and 96) of Joseon Dynasty Human Sample Collection (JDHSC) found in the LSMB tomb located in Seoul, Korea. Based on macroscopic and radiological analysis, dense, circular and homogeneous sclerotic bone mass was diagnosed as osteoma which laid in line with the cranial vault suture in both cases. Osteoma in case 75 and 96 measured as 376×369 mm and 375×241 mm, respectively. This study will provide the characteristic feature of button osteoma found in Korea and a differential diagnosis of the benign bone-forming neoplasm to help us better understand the types of diseases that affected the lives of people in early Asia.

Legendary lesions: An Analysis of Sharp Force Trauma of the Alleged Skeletal Remains of Saint Erik

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Erik Jedvardsson was the King of Sweden during the mid-12th century. According to Registrum Upsalense (AD 1344), Erik attended mass in Uppsala on the 18th of May AD 1160. Outside the church he and his men met and were outnumbered by enemies. The king was beaten to the ground and suffered several blows before being beheaded. He was buried in Old Uppsala and, although not formally canonized by the holy chair, Erik was regarded as a Saint by the church in Sweden from the end of the 12th century. In AD 1257 his remains were exhumed and placed in a reliquary. Sixteen years later they were moved to present day Uppsala Cathedral. During spring 2014 the putative remains of the King were analyzed. The objective of the joint research project was to try to verify the identity of the individual and to gather biological data from a 12th century individual of high socio-economic status (anthropological analysis, DNA and stable isotopes, CT-scan, DXA and PqCT examination). The reliquary has been opened on several occasions since the 13th century and today contains only 24 bone elements.

During the current investigation both antemortem and perimortem trauma were identified, some of which have not been previously documented. Among the perimortem wounds seven or eight were sharp force trauma and one was a puncture wound. The majority of the lesions were superficial, but one cervical vertebra exhibits a horizontal blade wound which has cut through the vertebral corpus. The detailed taphonomic investigation confirms that the individual in the shrine suffered a violent attack in accordance with the description in the legend. Several postmortem surface alterations to the bones may be related to the practice of excarnation. Here we present some of the preliminary osteoforensic results.

Möller-Barlow disease in archaeology: Preliminary study of biochemical detection

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Human bone is the most direct source for reconstructing health and living conditions of ancient populations. However, many diseases remain undetected in palaeopathology. Möller-Barlow disease (infantile scurvy) is a historically well-documented metabolic disease and must have been common in clinical and sub-clinical severity. Due to a long time span before the onset of symptoms and the subtle nature of bone changes osteological evidence is relatively rare (Brickley & Ives 2008). Möller-Barlow disease is caused by deficiency of dietary vitamin C (ascorbic acid) and evokes symptoms like fatigue, haemorrhage, inflammations, delayed wound healing and pain. Vitamin C is a cofactor for the hydroxylation of the amino acids proline and lysine which are essential for the production of intact connective tissue by cross-linking the propeptides in collagen. In a preliminary study we tested the detectability of Möller-Barlow disease by analysis of relative quantitative variability of hydroxylated amino acids in collagen (Pendery & Koon 2013). Samples (N=9) were taken from children with (n=3, cranium, femur, tibia) and without (n=4, cranium, femur, tibia) bone reactions indicative of Möller-Barlow disease, as well as from adults with lethal traumata (n=2; negative controls). The skeletal remains originated from two early medieval cemeteries from Switzerland. Gas chromatographic (GC) analysis revealed minor differences between the samples. Children with no pathologic alterations had almost the same values as the negative controls while children with bone reactions paradoxically exhibited slightly higher values of hydroxyproline and hydroxylysine. Future research demands for larger sample size and has to discuss sampling strategies. Beside possible misdiagnosis of Möller-Barlow disease it is arguable if only the newly formed bone should be analysed even though this could lead to problems related to small sample quantity. It also remains to be seen to which extent varying turnover rates of different skeletal elements, especially in children, must be taken into account.

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The earliest case of probable hip joint osteoarthritis in MLD 46 (*Australopithecus africanus*)

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MLD 46 from Makapansgat, South Africa, is a partial proximal *Australopithecus africanus* femur dated to 2.6 million years ago. It provides the only case of a mushroom- like osteophytosis at the femoral head to neck junction in early hominids. The femoral head itself is slightly oval and there is no flattening of the weight-bearing section of the head. Several small cavities filled with calcite crystals close to the surface of head likely represent subchondral cysts. The differential diagnosis for similar alterations of the hip joint is very broad. Here, we therefore compare MLD 46 to a modern human bone pathology reference series, the autopsy-based Galler collection. We find that hip dysplasia, Perthes disease, slipped capital femoral epiphysis and infections lead to a marked deformity with flattening and destruction of the femoral head, which is unlike to MLD 46. Although primary osteoarthritis typically also leads to

deformation of the head, nearly 40% of the affected femora in the Galler collection retained a well-shaped head that resembles MLD 46. Secondary osteoarthritis caused by coxa vara, femoroacetabular impingement syndrome, protrusion of the acetabulum, or rheumatoid arthritis cannot be excluded, however. Except for impingement syndrome and some rare aetiologies of protrusion of the acetabulum, these disorders affect individuals of an advanced age. Moreover, MLD 46 had to live with the pathology for several years until this marked osteophytosis was established. The individual age of MLD 46 is therefore probably one of the oldest of any Australopithecus discovered so far. As the pathology is potentially associated with a limitation of mobility, it raises interesting questions regarding behaviour, social structure and life history in early hominids.

Syphilis in life and death: different clinical and paleopathological diagnoses in the same individuals

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From the 15th cent. AD to the 1950s, syphilis was a health concern in Europe. In Portugal, the fear caused by this disease is evident in the clinical literature. However, paleopathological research has identified only 9 individuals with a possible/probable diagnosis of syphilis. This discrepancy between historical sources and skeletal evidence is a well-known pitfall of paleopathology. The aim of this study is to evaluate bone lesions and medical records of identified individuals who were diagnosed with syphilis. The analysis of 1647 individuals (505 skeletons/Coimbra Identified, 1142 skulls/International Exchange Collection) revealed that 13 (0.8%) died of syphilis. When the search was extended to the Coimbra University Hospital archives (covering deaths 1904-1937), 43 more patients were added. The 56 individuals (18 sk., 38 skulls; 39 males, 17 females; mean age=42.75, range=21-84 years), were macroscopically observed.

Following the diagnostic criteria (Hackett 1976, Ortner 2003, Steinbock 1976, Wallace 1919) none of the individuals would have been diagnosed with syphilis. Only 15 of them presented non-specific lesions, e.g. periosteal reaction; porosity in the skull; possible gumma, among others. According to medical information 4 individuals were in the primary stage, 6 in the secondary and 4 in the tertiary. The time between a patient's first hospital admission and death varied from 3 days-38 years (mean=9.11 y.). Logistic regression showed a high statistical significance ($X^2 w=7,508; p=0,006$) between the duration of the disease and the lesions' occurrence. The most common cause of death was 'cardiovascular' (n= 7), possibly a consequence of the main disease diagnosed. This study confirms the conservative clinical estimations of bone involvement in syphilis.

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Probable prostate cancer in a Pre-Incaic individual from Pukara De La Cueva, Northwestern Argentina

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Prostate carcinoma is a common malignant neoplasia that mostly metastasizes to bone in males. Nonetheless, the number of paleopathological cases reported is very small and only two from South

American individuals, almost of them being identified in Europe. The purpose of this paper is to document the lesions identified in a new Pre-Columbian (around 1400 AD) individual that corresponds to a middle-aged male from Pukara de la Cueva, Jujuy province, in the Northwest region of Argentina. The skeleton was found disarticulated but it is nearly complete and well preserved. The overall character of the lesions observed is predominantly proliferative in nature, but osteolytic and mixed patterns were also detected in both axial and appendicular skeleton. Macroscopically, this overall pattern and the distribution of the lesions are compatible with a secondary cancer. Radiological examination showed multiple dense areas with sclerotic borders in several bones, which confirm the previous diagnosis of prostate carcinoma. The exuberance and dissemination of the lesions all over the skeleton led infer individual cachexy implying that he would have been assisted by his family and/or social group during the chronic process. Carcinogenic risk factors are also discussed in order to ascertain the possible causes of the disease. This analysis adds a new evidence of a Pre-Columbian carcinoma in a South American native population and enhances the possibilities of an adequate differential diagnosis.

Dissection Material From a 1800s Hospital Cemetery in Copenhagen, Denmark

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At an excavation in Copenhagen, Denmark, 299 skeletons were recovered from a temporary cemetery, which was in use during 1842-1858 AD. The cemetery was used by the Copenhagen poverty hospital. It is known from historical sources that patients who died in the hospital, or corpses brought to the hospital, were used for dissection and teaching of surgical procedures. We here present the osteological lesions and discuss the probable procedures. We found sawn bone elements in 54 of the individuals. We found that most of the procedures could be divided into three general categories: 1) dissection; 2) surgical procedures; and 3) making anatomical study specimens. Dissection procedures are exemplified by calvarial opening (N=18) and sternal midline through- cuts (N=4); surgical procedures by trepanations (N=2) and the sawing over of both upper and lower limb bones (N=111 total); and the making of anatomical specimens by mandibular incisions and through-cuts (N=8) and longitudinal splitting of long bones (N=5). Other bones as vertebrae, clavicles and ribs are also present in the material. No healing was found in any of the bone lesions. It was not possible in every case to ascertain the nature or aim of a given procedure, nor if, e.g., an amputation was performed in vivo (albeit no healing), or due to practicing amputation techniques on cadavers. We compare our material to a like material from London, described by Fowler & Powers (2006), and note certain similarities, not least in terms of osteological evidence of dissection.

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World Mummies Map – a WebGIS platform spotting worldwide discoveries of mummified human remains

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Mummified human remains can be found all over the world dating as far back as to Early Neolithic.

There exist numerous scientific studies on mummies and often these precious cultural heritages are the lodestones in public museums. With the existing literature, however, one can only hardly assess the vast diversity of mummies present in different parts of the world. The so far only existing comprehensive overview on mummy findings displays the book "The scientific study of mummies" of Arthur Aufderheide. The unique information outlined in this book together with additional data on bog bodies (Van der Sanden, 1996) provided the starting point to build up our WebGIS platform "World mummies map" (http://webgis.eurac.edu/mummy/). This WebGIS platform aims to visualize all known sites where mummified human remains have been found around the world and provides background information to these findings. All information on the mummies themselves, their original finding site, deposit site and overall information is linked to a reference list with the appropriate reference to each mummy. Additionally the map features a variety of search algorithms through which the data can be filtered and displayed selectively on the map. The applicable filters are: Mummification type, age classification, dating and country. In addition it is possible to overlay the finding sites with climate maps displaying the mean temperature and precipitation of the last twenty years. In summary, our WebGIS "World mummies map" provides a unique platform for advanced researchers but also mummy researcher to-be containing important background information on human mummified remains and offering the submission of new mummy findings.
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The 7th century Alemannic gravesite of Niederstotzingen in southern Germany – Molecular relationship analysis of the human skeletal remains and screening for pathogens.

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The Alemannic burial place from Niederstotzingen in Baden-Württemberg is one of the most important early medieval graveyards in southwestern Germany, a site well known as "Separatgrablege". In the early 7th century (ca. 600-630 AD) high-ranking persons and their followers were buried here together with weapons and precious grave goods. The burials of fourteen individuals and three horses were first discovered in 1962 and have been subject to periodic analysis. In our own previous work, the age and sex of the individuals was determined by anthropological and PCR based analysis. Furthermore our first molecular analysis indicated maternal familial relationship between some individuals and two individuals were tested positive for tuberculosis. The aim of this study was to further analyze the molecular relationship of the individuals and screen for pathogens by using next generation sequencing technologies. This was done by extracting DNA from teeth of all individuals and enriching the endogenous DNA and the possibly present pathogenic DNA. Thereby we focused on the detection of *Mycobacterium tuberculosis* and *Yersinia pestis*. The enriched DNA was then sequenced on an Illumina platform. The mitochondrial reads were further subjected to a detailed haplogroup assignment and

maternal relationship analysis. Both, the results of the mitochondrial analysis and the data of the pathogen screening were compared to the previous PCR based results. In summary, our results provide first insights into the kinship of this high ranking Alemannic group and the presence or absence of infectious diseases in this early 7th century graveyard.

Microcephaly as observed in the late 19th century cemetery of the Meerenberg psychiatric hospital –diagnostic issues and the value of population specific data

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Microcephaly is a developmental abnormality characterized by the presence of an abnormally small cranium. Most authors define microcephaly as an occipitofrontal head circumference (OFC) two or more standard deviations below the mean of an age and sex matched population. The accurate identification of symptomatic microcephaly is problematic when performed in a palaeopathological context. This poster aims to identify and discuss individuals possibly presenting with microcephaly in the Meerenberg (MeB) skeletal collection while focusing on the value of contemporary population- and sex specific data. The OFC, g-op, eu-eu, ba-b and po-b of 54 crania from the MeB sample were measured. Intracranial capacity (ICC) was estimated using formulae described by Lee-Pearson (1901). Descriptive analyses were performed for the OFC and ICC of all crania, both for the populations as a whole as well as separated by sex. Based on these results, individuals possibly presenting with microcephaly could be identified. T-tests were performed to identify significant difference between the sexes and all results were compared to several other population groups. Male individuals in the MeB sample had significantly larger crania (mean = 530mm, s.d. 13.75) when compared to females (mean=510mm, s.d. 19.57). Based on the craniometric characteristics of the MeB sample, three adult females were identified as possibly presenting with microcephaly. Isolated cases of possible microcephaly can only be accurately identified when measurements are compared to sex- and age-specific, geographically related, soft tissue corrected clinical data.

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Tuberculoid leprosy: a forgotten clinical entity in paleopathology

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The existent paleopathological diagnostic criteria of leprosy only allow the identification of one type of patients, namely lepromatous ones. Thus, additional investigation is necessary to test if the distinction between lepromatous (LL) and tuberculoid (TL) leprosy in past human skeletons is viable. This research aimed to contribute to this debate by correlating both clinical and paleopathological data. Two samples were analyzed: a) 300 clinical files, 150 from each leprosy type –lepromatous (LL) and tuberculoid (TL) – and 150 from each sex, belonging to the medical archives of the Hospital-Colónia Rovisco Pais (HCRP), Tocha, Portugal, representing patients aged between 4-93 years old and screened between 1947-1985; b) 191 skeletons, 148 adults and 43 non adults, from both sexes, exhumed from the cemetery of the St. Jørgen's medieval leprosarium (13th-16th/17th centuries) at Odense, Denmark. Osseous lesions were

present in 13.0% (39/300) of the HCRP leprosy patients, mainly in those diagnosed with TL (84.6% [33/39]). Moreover, the risk of developing bone changes in TL was 6,8 times higher (OR=6.77; IC95%=2.60- 18.67) than in LL. Ten skeletons from the Odense sample presenting acro-osteolysis or diaphyseal destructive remodeling of hand and/or feet bones, in the absence of rhinomaxillary changes, are discussed as possible cases of TL. The comparison between lesions distribution patterns, in the rhinomaxillary region and in the hand and foot bones, in both samples demonstrated the viability of distinguishing LL from TL in human skeletons and unveils the potential of medical archives to palaeopathological studies.

An assessment of metabolic bone disease in a historic Chinese miner skeletal sample from the Witwatersrand, South Africa (AD 1904 – AD 1910).

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In this study the skeletal remains of 36 Chinese indentured mine labourers, who worked and died on the Witwatersrand mines in South Africa, during the period AD 1904-1910, were assessed for any signs of metabolic or nutritionally related signs of disease.

Historical information suggests that these indentured Chinese labourers came from poverty stricken communities in China where disease and malnutrition were often encountered. Once in South Africa they were again subjected to the harsh living and working conditions associated with mining. In order to aid in the interpretation of skeletal pathology associated with metabolic and nutritional diseases, non-specific signs of disease observed in a cadaver skeletal sample (n=100) with known causes of death (related to specific metabolic or nutritional diseases) were compared to pathology observed in the Chinese miners. Pathology that could be observed included a high prevalence of nutrition-related changes and linear enamel hypoplasia which suggests that the Chinese miners had been subjected to long periods of malnutrition and illness throughout childhood continuing into adulthood. Nevertheless, a large proportion of lesions associated with malnutrition showed some degree of healing. A high frequency of traumatic lesions, specifically peri-mortem fractures, was observed and may have contributed to the death of many of the Chinese miners. It therefore seems that even though the healing of pathological lesions associated with malnutrition indicated a period of improved nutritional intake, possibly during their time on the Witwatersrand mines, the high prevalence of peri-mortem fractures attests to the hazardous working conditions associated with deep-level mining.

Postcranial Fracture Patterns in a Large Skeletal Sample from Early Medieval Mannheim, Germany.

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As part of the comprehensive palaeoepidemiological analysis of the large Merovingian cemetery of Mannheim-Seckenheim, fractures of the postcranial skeleton were recorded. Previous studies of this sample (N=907) targeted cranial injuries, which revealed a highly sex-specific distribution of sharp force lesions, correlated with young adult age and high social status. Although females displayed some minor blunt force injuries, most cranial wounds were found in the male subsample. To complement the epidemiological dataset regarding skeletal trauma, the patterns of long bone fractures are put into focus here, and are analysed according to sex, age, body side and affected anatomical location, utilising a dedicated osteological recording system (cf Meyer/Alt 2012). Besides few cases of obvious interpersonal violence, the postcranial skeleton seems to reflect mainly the traumatic effects of accidents, falls and other mishaps of rural early Medieval life. All types of long bones bear evidence of fracture in this sample, but one location clearly stands out: the distal radius. While fractures of the mid-distal ulna are

often interpreted as parry fractures, those of the distal radius are commonly seen as results of accidental falls. To further characterise the bioarchaeological background of this pattern, a DXA-pilot study was carried out, assessing the bone mineral density of the femoral neck in three subgroups, among them the individuals with distal radius fractures. The preliminary results show that affected individuals, especially the women, have lower density values, further corroborating the assumption that postcranial fractures in this sample are mostly due to every-day accidents, and, in marked contrast to the cranial lesions, not a result of interpersonal violence.

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Selective mortality in Medieval to Early Modern Denmark illustrated using skeletal trauma.

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Accounting for the selective effects of mortality, as some individuals are more likely to die than others, is essential when reconstructing the risks of suffering any pathological condition in past populations represented by skeletal remains. That is illustrated using bone fractures, which are relatively clear in skeletons, as an indicator of heterogeneity in the risk of dying. Of course, observable skeletal conditions are only part of all such heterogeneity, much of which remains unrecognized in living people and, of course, skeletal samples. The healed skeletal trauma examined in this study are from adults in three medieval to early modern Danish sites: St Mikkel and Tirup in Jutland, and Sortebrødre on Fyn. For both sexes, trauma is divided into two categories reflecting their likely origin, accidental and intentional (interpersonal), and the samples are separated by sex. For men with healed cranial vault trauma, it is possible to estimate the relative risk of dying, which is higher than it is for men lacking such injuries.

The potential of novel lipid biomarkers for the diagnosis of tuberculosis in the Pleistocene

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A feasible working hypothesis for the evolution of tuberculosis involves a transformation from an environmental organism, such as *Mycobacterium kansasii*, via atypical "smooth" morphology tubercle bacilli, labeled "*Mycobacterium canettii*", through to the plethora of animal and human strains currently collected into the modern "rough" *Mycobacterium tuberculosis* complex. These modern lineages have emerged after a "bottleneck" around 3 –20ka BP (Supply et al. 2013 Nature Genetics 45:172). Validation of such an evolutionary pathway necessitates gleaning information from a range of biomarkers for tuberculosis, possibly present in archaeological material.

Genomic data offer the best discriminatory power, but it is proving difficult to record anything beyond the oldest proven cases of 9ka human (Hershkovitz et al. 2008 PLoS ONE 3: e3426) and 17ka animal tuberculosis (Lee et al. 2012 PLoS ONE 7:e41923). The use of specific lipid biomarkers is an alternative

approach, which may enable even older cases of tuberculosis to be indicated. The lipid biomarkers involved are long-chain compounds, principally mycolic, mycolipenic and mycocerosic acids, but other discriminatory components, such as members of the phthiocerol and phenolphthiocerol families, are showing great potential. The use of an expanded portfolio of lipid biomarkers will be exemplified by studies of mastodons (Hiscock Site, NY) and bison (Natural Trap Cave Wyoming; Idaho; North Sea; Kent's Cavern, UK).

Human Intestinal Parasites from a Mamluk Period Cesspool in the Christian Quarter of Jerusalem: Evidence for Long Distance Travel in the 15th Century AD

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Here we present the parasite analysis of the contents of a 15th century cesspool excavated in the Christian Quarter of Jerusalem. Twelve coprolites (preserved human stool) were identified from the cesspool matrix during sieving. They were prepared with disaggregation and micro sieving prior to digital light microscopy, and also ELISA analysis for dysentery. The results showed that all twelve coprolites contained the eggs of intestinal parasitic worms. Every coprolite contained the eggs of whipworm (*Trichuris trichiura*) and roundworm (*Ascaris lumbricoides*). These are spread by faecal contamination of food. However, some coprolites also contained the eggs of beef or pork tapeworm (*Taenia saginata/solium*) and fishtapeworm (*Diphyllobothrium sp*.). These are spread by the consumption of smoked, salted, raw or undercooked beef, pork and fish respectively. One was positive for *Schistosoma haematobium* (bilharzia). Two samples were positive for dysentery, one for Giardiaduodenalis and one for *Entamoeba histolytica*. One key finding of this research is the evidence for long distance travel compatible with pilgrimage or trade, suggested by the presence of these worms. For example, schistosomiasis has previously been found in populations along the river Nile in Egypt and the Euphrates river in Iraq, but never in the Jerusalem region. Fish tapeworm was common in northern Europe during the mediaeval period, but not found in the Middle East or the Mediterranean world at that time except in crusader period latrines. This suggests that Christians from northern Europe, and from either Iraq or Egypt, had travelled to Jerusalem and used the latrine during their stay.

Evidence of trepanation in Late Iron Age Switzerland (420–240BC)

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In Europe the procedure of trepanation is known since the Neolithic and is still practiced today in East African native tribes. Trepanation is the oldest known surgical intervention and is defined as the intentional penetration of the cranial vault with removal of piece of a skull bone. Therefore, it is believed that neurosurgery is one of the world's oldest professions. In this study two skulls with lesions from the Late Iron Age cemetery of Münsingen (420–240BC), Switzerland, are presented. Aim of the study was to analyse the lesions and to assess whether they were caused by surgical interventions. Sex and age of the individuals were determined by current morphologic-anthropological methods. Radiological examinations were performed with a multislice CT-scanner. Different trepanation methods and signs of

healing are discussed. In Switzerland about33 skulls with possible trepanations dating from Neolithic to medieval times are known and are presented in a short review. Studies of ancient surgical interventions provide important information of pre- and early historic populations. Trepanations of the skull such as the presented cases prove a profound understanding of the human body in ancient times.

Ordered to Die – A Mass Grave from the Battle of Lützen (1632)

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The Battle of Lützen (16. November 1632 greg) was one of the greatest and bloodiest combats of the Thirty Years War. Here, the Swedish King Gustav II Adolf was mortally wounded and with him about 6.000-9.000 soldiers lost their lives. While the king‘s body was recovered from the battlefield and honorably buried in his Swedish homeland, the dead soldiers were less well treated: the dead bodies were plundered and – in a highly functional manner – hastily buried in numerous mass graves. In summer 2011 one of these mass graves was detected at the edge of the small town of Lützen in Saxony-Anhalt, Germany. The mass grave was recovered en bloc and the skeletons were analyzed in situ under controlled conditions, accompanied by methods such as medical imaging techniques (X-ray, CT, DVT), histology and isotopic analyses (C/N, Sr/O). The grave included the skeletal remains of 47 men, ranging from about 15 to 45 years age at death. Numerous perimortem injuries have been found, among them are a high number of cranial gunshot wounds (ca. 47% of ind.). These help in the reconstruction of the course of the battle and the nature of violence in which these men died on the battlefield. Healed injuries, like fractures of the extremities or blunt and sharp force trauma to the cranium, provide information about previous medical treatment and many different pathological conditions evidence soldiers’ health and suffering. Long lasting deprivations during wartime and poor hygienic conditions have left osteological traces as well, and tell us about the adverse living conditions of the times.

A case of multiple Wormian bones in a combination with completely preserved metopic suture in adult skull

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The Wormian bones are inconstant but of frequent occurrence in healthy individuals and they may be found anywhere in or between the normal sutures and fontanels. However, Wormian bones are of significance and could be accepted as a possible indicator of abnormal development when they are 10 or more in number, with a diameter exceeding 6 x 4 mm, and arranged in a general mosaic pattern Cremin et al. (1982). Here we reported a case of a skull most probably belonged to an adult female individual with multiple Wormian bones. The skull is a sample of the osteological collection of the

Institute of Experimental Morphology, Pathology and Anthropology with Museum, Bulgarian Academy of Sciences. In the described case the Wormian bones are numerous and are placed along the sagittal, lambdoid and squamous sutures. They are mostly large in size and with mosaic pattern of arrangement in some sections. Furthermore, the skull is dolichocranic with hyperostosis cranii interna, moderate platybasia and notch in the posterior margin of the foramen magnum. The skull also shows a delayed sutural closure and completely preserved metopic suture in a combination with moderate frontal bossing. The frontal sinuses are hypoplastic and asymmetric and the mastoid air cells are underdeveloped. The facial bones are relatively small. There are also evidence of early loss of the teeth, dental carieses and enamel defects. Presumably, these features are a consequence of pathological conditions due to dysplasias with prominent membranous bone involvement and an increased bone density such as cleidocranial dysplasia and pyknodysostosis (Wolpowitz and Matisonn, 1974; Castriota-Scanderbeg and Dallapiccola, 2005).
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Sequelae of a neonatal septic arthritis in a Celtic woman?

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Deformities of the glenohumeral joints associated with a disproportional shortening of the humerus have rarely been observed in ancient human populations. Here we present and discuss the severe pathological alterations ascertained at the skeletal remains of an end juvenile/young adult female recovered at the Laténe cemetery from Oberndorf (Traisen Valley, Lower Austria; grave no. 44/1). Conspicuous features such as the bilateral, asymmetrical shortening of the humerus, necrotic humeral heads and the destructions of both glenoid articular surfaces, structural changes of the left femoral head and at the acetabular fossa, destructive lesions (cavities and "pitting") of the vertebral bodies as well as signs of a (probably active) meningeal inflammation characterizes this individual. The symptoms observed at the postcranial remains, in particular the disproportional short humerus and the deformations of the humeral heads seem to represent the late sequelae of a (neonatal/juvenile) septic arthritis[1]. As similar alterations and deformities may also be caused by tuberculosis[2], osteomyelitis, congenital dysplasia[3] or even a trauma, our contribution is dealing with differential diagnostic aspects of these pathologies in historical skeletal remains using different techniques and 3D-reconstruction. However, the consequences of these multiple necrotic destructions must have had potentially life-threatening implications, such as a devastating condition and functional limitation.
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Case of myositis ossificans progresiva on 19th century adult male skeleton from Adelaide, Australia.

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This case concerns the pathology of an adult male who died in the 19th century (around 1885) in Adelaide (South Australia). The case is curated in the School of Medical Sciences of the University of Adelaide and was deposited here by the first professor of anatomy in the city Archibald Wadston. The surviving post-cranial skeleton was analyzed using a morphological evaluation, radiological and histological methods. Myositis ossificans comprises two syndromes characterized by heterotopic ossification (calcification) of muscle. One of them is myositis ossificans progressive (also referred to as fibrodysplasia ossificans progressiva. FOP) is an inherited affliction, of autosomal dominant pattern, in which the ossification can occur without injury, and typically grows in a predictable pattern. As we know from the oral tradition, probably in the family of the man this disease has not occurred, so even though this disorder can be passed to offspring by people affected by FOP, is also classified as nonhereditary, as it is often attributed to a spontaneous genetic mutation. Ossification affects numerous muscles and tendons including the chest, pelvis, and extremities. Among the comorbid pathology is also evident ankylosing spondylitis of the lumbar vertebrae, ossification (fusion) of large joints, and osteoporosis. On an X-ray, ossifications are visible as denser opacities with sharp borders but also hazy densities of different shapes. The collected samples from the skeleton for histological tissue organization show a typical cortical bone with Haversian systems and osteons. There were no lesions typical of the neoplastic process. However, the differential diagnosis must include many tumoral and nontumoral pathologies. Visible changes substantially prevented movement of the person; it is very likely that the entire process was the cause of death.

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Genetic analysis of the Iceman´s coat fur: are there indications of ancient human blood traces?

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The Tyrolean Iceman or Ötzi has been the subject of constant analysis since his discovery over twenty years ago. However, it was not until almost ten years after his discovery that an arrow head was detected in his left shoulder. The injury has led to a fast, deadly hemorrhagic shock in the Iceman. In a recent examination of the Iceman's clothing and equipment using a forensic light source and biochemical test strips, possible blood traces have been detected on his coat. The aim of this study was

to determine the origin of the blood traces using next generation sequencing technologies. This was done by extracting DNA from fur at parts of the coat. The extracted DNA was shotgun sequenced on an Illumina Miseq platform. The sequenced DNA was aligned to reference genomes of human, animal and bacterial DNA. Over 20% of the sequences (~200,000) matched unique reads within the human genome. Further analysis demonstrated that the genetic material was from a male individual and showed damage patterns specific for ancient DNA. In contrast, shotgun sequences of fur that had no bloodstains contained less than 1% human DNA. This indicates that the bloodspot originated from a human individual and that his DNA was well preserved on the coat. Further analysis will be subjected to detect other biochemical blood residues supporting the DNA based results. Finally, a comparative analysis of the sequencing results will probably allow to determine whether the blood comes from the Iceman, e.g. from the bleeding arrow wound, or from another, yet unknown, person.

Paleopathological study of human remains from prehistoric Trentino-Alto Adige, Italy

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Our knowledge of the living and health conditions of prehistoric populations in the Southern Alpine region is very limited. Therefore, we performed a study of an anthropological collection , housed at the Science Museum of Trento, that comprise 138 individuals, dating from the Mesolithic, Neolithic, Bronze Age, until the Middle Age.

The skeletons come from various archaeological sites located in the Adige Valley of Trentino-Alto Adige. Out of the 138 skeletons, a number of 108 individuals, dating to prehistory, were selected for a detailed anthropological and paleopathological analysis. The age at death and sex determination revealed 14 males, 28 females and 66 individuals of unknown sex (64% sub-adults and 36% adults). The paleopathological analysis showed dental diseases, such as caries, intra vitam loss and periodontitis; degenerative diseases of the vertebral column and some evidence of enthesopathies.

Moreover, we observed stress markers and nutritional deficiencies (hyperostosis porotica, linear hypoplasia, and rickets), non-specific infections (Periostitis) and two possible cases of tuberculosis. A comparative analysis of the paleopathological evidences in the skeletal material from the different sites indicated a shift in oral pathologies and an increase of stress markers and nutritional deficiencies from the Mesolithic and Neolithic to the Copper and Bronze Age. These changes could be due to differences in subsistence strategies and lifestyle during the transition from hunter-gatherers to agriculturists. However, further studies are required to substantiate these findings. Taken together, this work provides new insights into the living and health conditions of the prehistoric population of Trentino Alto-Adige.

Living conditions in early medieval Dorestad

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The early medieval emporium Dorestad was an important European centre of exchange in the eighth and early ninth century. It is mentioned in several written sources and plays a pivotal role in the exchange of goods, people and ideas among Scandinavia, the British Isles and the Carolingian Empire. Historical sources indicate that Dorestad almost ceased to exist around the middle of the ninth century due to a series of Viking raids. Large scale excavations in the present day town of Wijk bij Duurstede have brought to light impressive harbor facilities, settlement zones and large numbers of graves. Despite the fact that Dorestad has been studied for more than fifty years little is known about the nature of its habitation. Was the place permanently inhabited? Can we determine whether there were seasonal fluctuations, with e.g. a larger population during the summer months? Did the supposedly violent end of Dorestad result in high numbers of trauma caused by sharp bladed weapons? This paper will present the

results of the physical anthropological and palaeopathological study of human remains of 253 individuals excavated at the De Heul site. The demographic composition of the population and the prevalence of pathological conditions are studied to determine whether Dorestad was inhabited on a permanent basis and what the living conditions were. Special attention is paid to indicators of diet and trauma related to violence. These results are compared to contemporaneous populations in order to determine whether the cemetery population resembles the population of Carolingian towns.

"Warriors versus working men"? – An entheses and joint study on the early medieval skeletal remains of Thunau/Kamp

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Supposed indicators of activity, i.e. frequency of entheseal changes (EC) and osteoarthritis (OA) were visually recorded in two early medieval (9th /10th century A.D.) skeletal populations from Thunau/Kamp, Austria. They were recovered at two archaeological sub-sites: a fortified settlement, including a necropolis on a hill plateau along the palisade of the manor house, probably reserved for social and military elites ("uphill"), and a large riverine settlement at the foot of the hill, a so-called "suburbium", where burials and an area of "industrial" character were discovered ("downhill"). Possible social differences between the two sites have been deduced from archaeological analysis. Selected fibrocartilaginous muscles and joints were put together functionally for comparison. Because both groups were rather small with a comparable average age of 40±2y, individuals were pooled for calculation of frequencies and univariate analyses. A covariance according to the occurrence of EC and OA changes was hypothesized. For nearly all individuals, a high frequency of slight changes in the hip and knee joint was found. A high percentage of changes was visible in the shoulder joints of males in both groups symmetrically, and in the right wrist joints of the downhill males. High frequencies of OA changes were found at the ankle in uphill males and females; eburnation was generally rarely observed. Concerning EC, only the downhill males showed noteworthy frequencies of pathologies in the right triceps brachii and the biceps/brachialis muscles. The changes in the females of the two groups seem more homogenous, they may therefore have had more traditional tasks (spindle whorls were found). Neither in males nor in females, a special correlation of EC and OA was found.

Diagnosing tuberculosis in skeletal populations

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Research into the skeletal expression of tuberculosis is made difficult due to both low skeletal involvement rates and problems of differential diagnosis. However analyses of modern reference samples of skeletons with diseases of known diagnosis have led to well-documented descriptions of the bone pathology related to tuberculosis. However most attention has been given clear diagnosed cases of the disease and diagnostic tools that enables diagnosis in early or little progressive bone involving stages is needed.

With such it is possible more precisely to estimate the prevalence of bone involving tuberculosis in past populations. This study presents a manual for registration of tuberculosis that allows early stage disease diagnosis, large skeletal sample registration and registrations by different observers for comparative studies. Skeletal material from approx. 1400 individuals living in the town of Ribe in the Southwestern part of the Denmark is included in the study. Skeletons were excavated from two parish cemeteries - the Grey Friars monastery dated to the time period AD 1250 – 1550 and the cemetery connected to the cathedral in Ribe dated within the period AD 800 –1805. A preliminary study of 279 skeletons from the Grey Friars Monastery found 52 skeletons with mild bone changes and nine with severe bone changes related to tuberculosis. These skeletons were thoroughly examined and all tuberculosis related pathology was described according to skeletal elements involved, type of bone changes and progress of

disease – either mild or severe. Based on these objective descriptions and published research describing skeletal involvement in tuberculosis a registration manual was drawn up. All skeletons from Ribe were then registered according to the manual in order to examine the epidemiological properties of tuberculosis and if necessary to refine the manual. The lesion type frequencies were calculated and the relations of lesions were analyzed by chi2 tests. In this way lesion types that did not occur in connection to other lesion types could be excluded from the manual.

Childhood illnesses recorded in the adult skeleton: infectious middle ear disease, Harris lines and linear enamel hypoplasia

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This study examines two adult skeletal populations from medieval Denmark, an urban (n=109) and a rural population (n=264). The rural population is considered low-status and the urban population a high-status. Both cemeteries were used throughout the medieval period. The two populations were examined for three skeletal markers that have been proposed to be indicators of childhood health. Two are well known to paleopathology, namely Harris lines and enamel hypoplasia. The third disease marker is less commonly used: the permanent changes in the temporal bones, induced by infectious middle ear disease in childhood. Evidence of infectious middle ear disease is examined using CT images. Most reports of infectious middle ear disease are based on case reports, with few studies on population level, and little international published data of infectious middle ear disease in the Danish medieval period exists. The three skeletal markers are examined by determining their co-existence and correlation. Results showed that the urban population expresses a higher level of paleopathological evidence, compared to the rural population. However there was no statistical significance for their co-existence for the adult skeletons.

A test of inter- and intra-observer error for an atlas method of combined histological data for the evaluation of linear enamel hypoplasia

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We present here the dental chart data from Reid and Dean (2000; 2006) and Holt et al. (2012), combined and reworked into a single color atlas. This color atlas is produced with the purpose of aging the chronology of linear enamel hypoplasia. This color atlas is suitable for working with a single individual or a large skeletal collection within biological anthropology. The color atlas is tested for inter- and intra-observer error, using 178 teeth with linear enamel hypoplasia from thirty archeological specimens.

Results shows that the colored dental atlas as presented here, can be used with confidence for evaluating the age of an individual at the time when a biological crises causes the formation of linear enamel hypoplasia. In addition, the format as presented here was found to be easy to work with. The relevance of this study to biological anthropology is the presentation of the combined histological data as a colored dental atlas for use in the field or a laboratory setting.

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Investigating the late/post medieval mass burial from the Old Hospital cemetery in Aalst, Belgium

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During construction works in the garden of the 'Old Hospital' in Aalst, Belgium in 2012, a small area of 3m by 2.5m was excavated and revealed human skeletal remains from 15 single inhumations and a multiple burial of 8 individuals. The former hospital has a long history, placing the origin of the Old Hospital back in the Carolingian period while the hospital cemetery continued to be in use until 1780 AD. Yet little is known about the individuals who were buried there. The discovery of the single inhumations and the mass grave within the hospital's grounds reveals a glimpse into the demography of the patients treated and the nature of the conditions they suffered and/or died from.
Especially the find of the multiple deposits in a small, very deep burial (length: ca. 2m; width: 70cm; depth: ca. 2.6m) brings up many questions. This poster will focus on the paleodemographic and the paleopathological observations of the individuals from the mass grave, and their scientific potential for further research. The mass burial was dated in the late/post medieval period by the archaeologists on site and samples for 14C dating are being analyzed for confirmation. Due to the waterlogged conditions the skeletons are preserved in an excellent condition (see Figure 1). The individuals were buried in plain earth, without any grave goods. The individual found in lowest position in the mass grave was almost completely covered by a layer of straw. All skeletons but one lay in prone position. The position of limbs suggests the bodies were thrown haphazardly into the pit. All individuals are adults younger than 40 years. Of the 8 skeletons, 6 are male and 2 are female. The simultaneity of deposits and the deviant position of the bodies suggest unusual mortality. The bodies show no evidence of violence and are believed to have been the victims of an epidemic. These results bring new additional data to the historical knowledge of the use of this hospital cemetery in specific particular and to burial archaeology in general.

Living with the consequences of injury: a medieval perspective from London

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Traumatic injuries powerfully transform lives, particularly those resulting in impairment. This physical transformation will affect a person's social identity, potentially stigmatising them as impaired. As the body is a record of such events, skeletal changes can be used to explore personal histories. We selected two adults with ante-mortem injuries excavated from the medieval cemetery of St Mary Spital, London (1100-1550) (Connell et al. 2012). A male with an unreduced left shoulder dislocation & ankylosis of the right ankle & left sacroiliac joints, & a female with a sharp-force weapon injury to her cranium, & fractures to her ribs, left leg & foot. Our study aimed to understand: injury mechanisms & healing, subsequent skeletal adaptations & their secondary effects. We employed digital radiography & macroscopic observation to diagnose & record the skeletal changes, & used the bioarchaeology of care model to evaluate assistance (Tilley and Oxenham 2011). We determined that the shoulder injury caused abnormal torso movement & may have increased his fall risk. The female would have required a walking aid, & because of poor fracture reduction, may have been left with muscle dysfunction & nerve irritation.

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Neuropathic arthropathy of the shoulder (Charcot shoulder): Presentation of two cases in *H. sapiens* and *P. troglodytes*

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We present here two cases of neuropathic arthropathy of the shoulder, a chronic form of arthropathy due to a decreased sensory innervation. To our knowledge, these are the first cases of unilateral neuropathic arthropathy of the shoulder reported in the paleopathological literature. One case corresponds to an adult male skeleton exhumed from a forensic context from Spain postwar period (1938-1942). The second case corresponds to a *Pan troglodytes* adult male skeleton from a dissection room collection of nonhuman primates (Anatomical Museum, Faculty of Medicine, Valladolid, Spain). In both cases, a massive resorption of the proximal third of the humerus (right in *H. sapiens*, left in *P. troglodytes*) is observed, affecting the glenoid fossa. We discussed possible etiologies for the pathological changes described (syringomyelia, diabetes mellitus, tabes dorsalis, traumatic injury), as well as the symptoms associated, whose descriptions can be useful in a forensic and veterinary context.

Type A defect of the posterior synchondrosis in a juvenile Neandertal first cervical vertebra?

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Congenital defects of the first cervical vertebra have been described and classified in the medical literature. Modern human Type A posterior atlas arch defects are presented as small posterior midline gap as the result of failure of posterior fusion of the two lateral ossification centers. These anomalies are probably due to a developmental failure of chondrogenesis rather than a primary disturbance of ossification. Type A defects are reported to be the most frequent posterior atlantal arch defect, ranging in frequency from 0.6 to 5% in modern human populations. We discuss here the presence of a type A defect in a juvenile Neandertal first cervical vertebra recovered from El Sidrón site (Asturias, Spain). The presence of a type A defect in a juvenile C1 with unfused anterior synchondrosis has to be differentiated from normal-for-age absence of fusion of the posterior synchondrosis. Detailed anatomical descriptions of the posterior synchondrosis of subadult atlases of modern humans, and of adult atlases with type A

defects are provided. The presence of a type A defect in the juvenile Neandertal C1 is discussed in light of these observations and in light of the associated age estimates.

Applying the "index of care" to a person who suffered leprosy in late Medieval England

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Inferring disability and related caregiving from archaeological skeletal remains is challenging (Roberts 2000). Even more challenging is mapping clinical signs and symptoms onto individuals with skeletal changes indicative of a particular disease, such as leprosy, a bacterial infection. The impact and experience of every disease will vary among all individuals affected, as will the care provided. Attempts to determine disability and care of people in the past from a bioarchaeological perspective have been made in the past, but it is only very recently that a detailed, systematic approach has been proposed (Tilley and Oxenham 2011). This study applies the "Index of Care" (Tilley and Cameron 2014) to one individual from a Medieval leprosy hospital cemetery (Chichester, Sussex; 12th-16th centuries AD; Magilton et al 2008). The skeleton was selected because it has a range of bone changes specific to leprosy, and others that are non-specific but could be leprosy- related. These changes are described and differential diagnoses considered; associated funerary and socio-cultural contextual data are incorporated (Step 1). Clinical data for leprosy are noted to assess: how leprosy affected the life experience of the person, the impact on their function, and whether functional loss would have needed care provision (Step 2). The likely nature of care provided is identified (Step 3) and interpreted with respect to the person concerned and the community in which they lived (Step 4). Following the "Index of Care" steps it is possible to better assess the likelihood of disability and care provision from skeletal remains. However, the socio-cultural context of this site/region, where leprosy-related stigma may have been present, makes interpretation complex.

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An occupationally related disease in a 19th century skeleton from north-east England? The past and present of "phossy jaw"

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Analyzing the impact of a person's occupation has been an endeavor in bioarchaeology for many years. However, there have been critiques of the value and rigour of such studies (Jurmain 1999), mainly because the skeletal indicators reported have a multifactorial aetiology. This paper approaches "reconstructing occupation" from the premise of skeletal changes in a skeleton from an area of north-east England where historical evidence describes hazardous industries. Pathological lesions are described in a 12-14 year old individual buried in the Quaker cemetery of Coach Lane, North Shields,

Tyne and Wear (n=236; c.1711-1857AD; PCA 2012). Skeletal changes throughout the skeleton are described and differential diagnoses considered, and comparisons made with documented pathology museum data. The mandible's appearance is similar to the condition called "phossy jaw", or osteomyelitis associated with exposure to phosphorus. Contemporary historical data indicate that the matchmaking industry was one of the local industries where this population worked. This condition is described in more recent literature in association with bisphosphonates used for treating cancer and osteoporosis (Jacobsen et al 2014). This skeleton is discussed alongside the extant historical data about matchmaking (and child labour) to show the benefits of this type of bioarchaeological study to approach what our ancestors did "for a living". It also considers, from a clinical standpoint, the challenges this person may have faced as their identity changed, likely affected by the experience of pain and swelling of the mandible (facial appearance), and the foul taste and smell of pus draining from the lesions. These signs and symptoms may have influenced how the person and their community reacted to "phossy jaw".
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Paleopathology of nine cemeteries in Southern Finland, taphonomy and some problematic case studies

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This paper discusses nine different cemeteries dating from 12th to 19th century in Southern Finland. These sites represent all together 579 individual skeletons.

Preservation of Human bones in Finland is discussed briefly with the help of new type of informative images. General overview of paleodemographic profiles of these sites are presented. Differences and similarities between sites, sexes, age at death- classes and different stature in the prevalence of paleopathologically recorded lesion types are presented and discussed critically. Dental diseases were more common in females and trauma in males. Ante Mortem Tooth Loss, abscesses, periodontal disease, osteoarthritis, vertebral osteoarthritis and trauma were more common in older adults. This is natural since they are age progressive or cumulative diseases. However, young adult individuals seem to have more caries and calculus than the older adults. This may be explained by AMTL. Schmorl's nodes appear first in puberty and they are found steadily through all adult age classes. Cribra orbitalia and Linear Enamel Hypoplasia are childhood stress indicators and most of them were found in children and young adults. None of the pathologies alone correlated with adult stature. There were statistically significant differences between sites, especially dental diseases were less common in the coastal towns. Other pathological lesion types such as spondylolysis, osteochondritis dissecans, enthensophytes, metabolic diseases (scurvy and possible rickets), osteoporosis, congenital malformations (such as spina bifida, lumbalization, sacralization), infectious diseases (periostitis, sinusitis, syphilis and tuberculosis), endocranial woven bone formation and neoplasms (as for example osteomas) were found less frequently. Later half of this presentation deals with some interesting and problematic cases of pathology from these sites that are still waiting for differential diagnosis. I hope the audience can help me with making differential diagnosis of at least some of these cases.

Skeletal and dental health status in remains exhumed from a cemetery of political prisoners from Spain postwar (1938-1943)

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More than five thousand remains have been exhumed since 2000 from mass graves and prisoners cemeteries from the Spanish Civil War (1936-1939) and postwar periods (1938- 1943). Diverse skeletal and dental variables have been recorded in the analysis of the remains with the main objective of identification and returning of the remains to the requesting families. In this work we present skeletal and dental evidence of the health status of political prisoners from the immediate postwar period (1938-1943). Variables related to the growth period (mean stature, linear enamel hypoplasia), variables related to the health status at the time of death (dental data such as antemortem losses, carious lesions, abscesses), and archival evidence for the cause of death are presented and discussed in relation to the socioeconomic structure of Spain during the first third of the 20th century, and in relation to the specific conditions suffered by the imprisoned population in Spain postwar.

How violent was the European Neolithic?

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There are differing views regarding the extent to which the European Neolithic was a violent place. Many researchers emphasise the sense of community created by early farming societies, seeing this as an essentially peaceful time. Others point to the growing evidence for skeletal trauma clearly relating to interpersonal violence. These two seemingly opposing views can be held, because the question remains, how common were such events, and what proportion of the overall population was affected? In an attempt to bring the debate forward, this presentation discusses the results of a recent study focusing on Neolithic cranial trauma from selected regions of northwest Europe.

Comparisons are not straightforward, as different collections exhibit varying degrees of preservation and completeness. Nevertheless, some broad conclusions are possible. There are hints of regional and temporal patterning, though dating is often problematic, especially in chambered tombs that can see repeated use over centuries or even longer. The prevalence of peri-mortem cranial injuries appears to be fairly consistent, averaging around 3-6%; ante-mortem injuries are regionally more variable, but are generally two to three times more common. Men, women and children were all affected by both lethal and non-lethal violence. Of course, cranial injuries represent only one form of interpersonal violence found on the skeleton, and it is clear that other individuals suffered projectile injuries to the body. Taken together, it can be suggested that, unsurprisingly, the Neolithic was not an entirely peaceful place, yet the prevalence of violence is by no means as high as seen in the archaeological record in some other parts of the world, or as documented in the ethnographic record. So the hawks and doves can still both maintain their positions. The challenge that remains is how to integrate this evidence into our narratives of the period.

Patterns of disease at Sidon, Lebanon -• a Middle Bronze Age population in regional diachronic comparison

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Since 2001, excavations are taking place under the auspices of the British Museum at the College Site of Sidon, an ancient ceremonial and burial ground completely reserved for archaeological research and not threatened by development (Doumet-Serhal et al. 2004). This unique situation has so far led to the recovery of c. 140 skeletal individuals mostly from the Middle Bronze Age (first half of the 2nd millennium BC). Here we present an overview of skeletal palaeopathological alterations assessed from all adolescent and adult individuals (N=58) (for aspects of infant and child health see Schutkowski and Thomas 2013). While caries frequency was moderate with 9.9%, 61.5% of individuals displayed linear enamel hypoplasia. Signs of infectious disease present as sinusitis (13.6%), new bone formation on the pleural surface of ribs (39.5%), endocranial lesions (5.2%), and periosteal reactions of the lower limb bones (47.4%). Cribra orbitalia are present in 37.5% of the sample. Evidence of trauma is mostly associated with accidental ante mortem lesions and is low in general. Half of the individuals in the sample suffered from degenerative joint disease, largely seen in the vertebral column.
Compared across space and time the middle Bronze Age population of Sidon roughly follows a trend observed in the wider region of only low to moderate frequencies of chronic disease. Coupled with the absence of signs of interpersonal violence the assemblage reflects a prospering population of supra-regional importance living in times of relative political and economic stability.

Comparison of Three Cases of Femoral Shaft Fractures

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Today, femoral fractures are medical emergencies which can be easily dealt with. Modern narcotics enable surgeons to reduce the fracture without immense pain to the patient and the fractured site can be stabilized by screwing or implanting plates. In archaeological contexts, fractures of the femur often are very spectacular, especially when no attempt to reduce it was made. In this paper, three cases of femoral shaft fractures, which had been survived and which appeared to be well healed, will be looked at, two dating from the Bronze Age from Russia and one from the Scythian period in Kazakhstan. The cases presented display massive bone growth, exostoses, as well as rotation, angulation, and shortening which led to further complications that appeared after healing (arthritis of the knee). Additionally to this, smooth bony cushions were observed, diagnosed as being caused by myositis ossificans traumatica/heterotopic ossification. A closer look at the mechanisms of healing via x- ray and CT scans as well as histology research shall enhance the view on the healing of non-reduced bones. Looking at the findings, it will be discussed how and why the post- traumatic complications appear, the development of arthritis will be considered and also whether or not myositis ossificans traumatica could be a typical sign of this kind of fracture. The skeletons were also affected by several different health issues, one displaying possible Perthes Disease and a cranial fracture, another displaying not only trauma to the femur but to the patellae as well. The connection between these issues and the fracture will be discussed.

To the question of the Christianity expansion in the North-Eastern Pontic region (Black Sea, Russia)

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The expansion of the Christianity in the North-Eastern Pontic region in 9thCE was connected to the building of numerous religious centers often with the help of invited Greek masters. It was considered before that in the region of Imeretinskaya Lowland first churches appear just on 19th century AD. The latest archaeological discoveries concerned with the salvage excavations during the construction the Olympic objects (XXII Winter Olympic games) revealed the unique and well preserved Christian church which could be dated by 9th-11th cent. AD. This fact changes the picture of known pathways of Christianity spreading in this area. One more feature which differs the dome is the persistent of underground crypt, where we can find the remains of more than 10 males of 25-29 years old at death.

Skulls of 4 individuals had the traits of similar sable wounds on temporal and parietal bones. The character of injuries and archaeological data lead us to the conclusion that multiply burial was the result of one war conflict. It is known that during that time the pagan and Christian population coexisted. Thus the main goal of the project I was to define the profile of the population, which left the cemetery around the dome paying special attention to the high rank burials inside aisles and taking into account that victims in the crypt could represent the monks who were trying to defend the complex. Reflection of migration processes during these time is also a very important problem. Bioarchaeological approach has been applied to the studying of human remains. Besides palaepathological analysis various anthropological methods such as odontological investigation, trace element analysis, morphological description were used as well as 3D visualization of multiply burials.

To the question of distribution of the specific infections among rural medieval population in Russia by the example of Rozhdestveno cemetery (15 th-16th cent. AD)

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Our study was based on the osteological material from the rural cemetery of the settlement Rozhdestveno I (Odintsovo, Moscow region). The material was obtained due to salvage excavation in 2006-2007 under the direction of Mikhail Gonyanyi. The burial site could be dated by 15th-16th century according to mass material and specific artefacts. Totally the 152 burials have been studied. Most of them were redeposited. This fact argues for the prolonged use of the same cemetery clusters partly due to limitation of the dwellings existence on the border. High percentage of the children mortality (42%), and the analysis of the stress markers on the skeletons of adult individuals let us to suppose the unfavorable living conditions of the society. Both among the male and female population (totally in 12,6% of cases) the complex of features which allow us to speak about the specific infection (treponemal). The most remarkable manifestations were found on the female skeleton (20-29 years old, burial 122). In spite of partial preservation and in some cases taphonomical destruction of compact layer of the bone, we found the substantial changes of the bone tissue on the long bones of extremities, scapulae and ribs. Almost on all preserved bones proliferate changes of the surface are noted. Acromial processes of scapulas and outer surface of 12th rib are covered by porous layers. Also on the upper and lower extremities regions of periosteal inflammation are marked. On the tibial and femoral bones the process is more manifested. Deep lesion focus (12,6 mm) in the distal part of left tibia involves the medullar canal and differ from the gummatous destructions on the right tibia. Probably it is complication of the syphilitic gumma by secondary pyogenic infection, which led to syphilitic osteomyelitis. The presented case is the most expressed and typical for the tertiary syphilis among the investigated material of Rozhdestveno I site. Written sources testify the extensive expansion of this disease on the territory of Europe at the end of 15th-16th centuries. It could be confirmed by synchronous findings in Rostov Velikyi, Vologda, Mozhaisk and gives us the evidence of appearance of venereal syphilis on the territory of Eastern-European lowland.

Osseous Deficiencies after Dislocation of the Shoulder Hill-Sachs lesion and Bankart lesion

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Dislocation of the glenohumeral joint forced by nontraumatic or traumatic reasons tends to result in deficiencies in the native osseous topography of the humeral head and/or glenoid. In the majority of cases dislocation of the shoulder can easily be reduced and may go entirely unnoticed, except moderately large Hill-Sachs lesion and Bankart lesion. Hill-Sachs lesion is characterized by a humeral head

compression fracture induced by the pressure of glenoid rim in the course of an anterior or posterior dislocation of the shoulder. A Bankart lesion usually results from the detachment of the glenoid labrum, respectively the bony margin and is highly associated with the matching humeral lesion. The presence and size of these lesions increases with recurrent instability episodes as well as total time of symptomatic instability. The present study focuses on the evidence of either of these lesions ascertainable in ancient remains, e.g. Early Medieval population of Furth-Mautern (Lower Austria) and pathological preparations collected in the 18th and 19th Century AD (Pathological-Anatomical Collection-NHM Vienna, PASiN). We used macroscopic inspection, a reflector microscope and radiography for anthropological investigation. Amongst others we present a particular case of a rare locked posterior dislocation of a right shoulder with large Hill-Sachs deformities and new build joint socket. We aim to identify different phases of bone loss or affected humeral head and glenoid cavity and discuss possible differential diagnosis.

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Radiological, tomography and histological methods applied to osseous changes due to otitis media and mastoiditis in a pre-historic and historical skeletal material from Poland

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Otitis media (OM) is a disease which may lead to mastoiditis and severe endocranial complications. Since antibiotics have become available, OM and mastoiditis have become rare diseases in modern Western societies. However, it is still common in developing countries. In earlier historical and prehistoric times, OM and mastoiditis must have posed a serious threat to people's lives, and that the prevalence of this diseases is probably underrepresented in the paleopathological literature. The present study identifies pathological changes in the pneumatized cells of the mastoid process in human skeletal samples from the area of modern Poland. A total of 978 mastoid were examined for this study: 187 neolithic (4300-4000 B. C.), 170 wielbar culture (I-IV), 332 early medieval (XII-XV AD and 289 modren (XVI-XIX AD). The analysis of this material using macroscopic, radiological, CT and histological investigations and draws some epidemiological conclusions as to the frequency of the disease diagnosed in the archaeological samples. Osseous changes because of mastoiditis (sclerotic and sclerotic with reduced pneumatization) were diagnosed in 63.5 % of the temporal bones (significant). The frequency in the skeletal sample from early medieval skulls was higher (69.3% vs 94%) than in the sample from neolithic (58.6%), wielbar culture (69%) and modern century (73.3 vs 84.2%). In medieval and modern populations males were more often sclerotic changes than females (not significant). In both prehistoric populations (significant) females were more (69.3%) often affected than males (59.1%). The high frequency of the morphological changes in the pneumatised cells of the mastoid process observed was most likely due to an accumulation of osseous changes during individual lifetimes and supports the hypothesis that OM and mastoiditis was a serious health problem in pre-historic and historical human population and diagnosis of pneumatised mastoid cells provides a useful tool for the study of pathological conditions in the middle ear region in ancient populations.

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A case of an orbital treatment in a medieval skull from Kabyle, Bulgaria

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A case of an intentional treatment of the right orbit was observed in a medieval skull from Kabyle, Southeastern Bulgaria. Kabyle was one of the most important and largest towns in Thrace. In the end of the 6th century it was destroyed. In the 9th century a small medieval settlement arose in the territory of the ancient town. The skull reported was part of the bone material revealed in the archaeological excavations, supervised by Professor L. Getov. The necropolis was near to the northwestern gate of the ancient town of Kabyle and was dated in 12th- 14th century. The skull belonged to an adult individual (20-25 year-old). The postcranial bones were not available. The right orbit was treated with a removal of the orbital apex. The bone area around the superior orbital fissure and optic canal and a part of the great wing of the sphenoid bone were removed. The smooth lateral edge of the incision suggested the intentional treatment on the orbit. The aperture obtained was providing a direct contact to some brain structures, especially to the temporal zone and cavernous sinus. Cribra orbitalia was observed on the roof of the orbit. However, there were no obvious traces of any wounds on the skull, from which could be assumed that the eyeball and the adjacent bone surfaces were badly injured and there was an evidential need for a medical treatment. But yet, it could be a case of transorbital stab penetrating brain injury, in which a part of the orbital apex was affected and this could be a possible reason for such a medical treatment. Because of the lack of traces of healing, it must be supposed that the orbital treatment was performed perimortem. Thus, it could be a ritual treatment, performed near after the time of death, or a medical treating of a primary wound.

Making a Hole in the Head – A Probable Neolithic Trepanation from Östra Torp

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In June 1939, Swedish archaeologist Bror-Magnus Vifot, excavated a partly destroyed grave. Except from a skeleton in crouching position, though partly disturbed, a hole-edged flint axe, three flint blades and some coarse pottery sherds where found, indicating the grave to belong to the Swedish-Norwegian Battle Axe Culture (BAC). During bioarchaeological investigations of Late Neolithic Scania in 2013, the skeleton, an adult male individual, was found to suffer from two skull traumas, one due to blunt force and one 30×30 mm large penetration. Both skull traumas showed notable degree of healing. Considering the penetrating trauma could not be associated to any fracture lines or internal beveling, being considerably round in shape and showed a notable degree of healing, it was interpreted as a deliberately preformed trepanation with a happy ending.

Study of palaeopathological lesions in lime burials from a medieval and post- medieval cemetery in Mechelen, Belgium.

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The inclusion of lime in burials is well known for medieval and post-medieval cemeteries, with contextual, chronological and regional diversities, as well as different intentions and several

misconceptions. Lime could have been applied to burials to desiccate and preserve the corpse, with the intention to dissolve the body and accelerate decay, to absorb putrefaction fluids and reduce odours, as a disinfectant, or as a religious symbol and visual characteristic. During the excavation of the St. Rombout's cemetery in Mechelen, Belgium, 3575 graves were recovered, dating between the 11th and 18th century AD. Five graves contained a white substance, either as a base lining or as part of the grave fill. The white substance was analysed and identified as calcite, suggesting the graves were lime burials. Analysis of the burials shows variation in the characteristics of the context, with single and multiple burials, plain earth and coffin burials, variations in characteristics of the lining and in the treatment of the body.
Analysis of the human remains indicated an unusual mortality profile, with a high proportion of young and male individuals. The palaeopathological study showed a high frequency of periosteal new bone formation, likely related to infection, besides a high number of lesions associated with physical and metabolic stress. The combined study of the burial characteristics and the study of demographic composition and palaeopathological lesions, aids the interpretation of the use of lime in burials as well as the interpretation of the palaeopathological lesions in their biocultural context.

Virtual endocasts as a diagnostic tool for microcephaly

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The accurate identification of microcephaly is problematic when performed on remains from a palaeopathological context as population, age and sex matched cranial measurements are often not available. However, Falk et al. (2007) suggested that this problem could be overcome by assessing the morphometric characteristics of cranial endocasts. This poster investigates the value of virtual cranial endocasts as a diagnostic tool to identify skulls from an unknown context as being microcephalic. CT-scans were performed on nine crania of which six were previously identified as being microcephalic and three were of individuals with a normal cranial circumference. Based on the CT data, virtual endocasts were created using AMIRA version 5.0.Measurements of the endocasts were taken as described by Falket al. (2007).All measurements were compared to data as published by Vannucciet al. (2011) and Falket al. (2007).Five of the six microcephalic crania were classified as presenting with one or more morphometric characteristics suggestive of microcephaly. One individual identified as possibly presenting with microcephaly due to a small cranial circumference did not present with any abnormal morphometric characteristics. One of the three normal individuals also presented with one morphometric characteristic suggestive of microcephaly.
Microcephaly cannot be positively identified purely based on the metric characteristic of an endocast. However, the data may be used to support a diagnosis based on an abnormally small cranial circumference or cranial capacity.
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Long bone growth and dental development in Medieval Austria

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Elucidation of three main issues was the aim of our study: i) establish site-related age estimation functions for long bone dimensions, ii) reveal potential growth retardations of subadults, and iii) determine possible correlations of growth interference with the occurrence of Harris lines (HLs). A selection of 200 medieval subadult skeletons from the total of 4,500 inhumations (1800 subadults) from a cemetery at the Cathedral Square at St. Polten (Lower Austria) was analyzed: Four dimensions of each long bone (A diaphyseal length, B maximum distal metaphysis breadth, C diameter and D circumference at midshaft) were measured. The dental age was estimated using x-rays of the jaws (Ubelaker, 1988). The general stature was calculated according to Ruff (2007) and HL statuses were verified by x-rays of the Tibia. Highly significant correlations ($p \leq 0.0001$) were observed for bone dimensions. Quadratic regression models between dental age and bone dimensions resulted in more accurate functions than linear models. Not surprising, the heights of former individuals were consistently smaller than those of today´s. To address the issue regarding growth dynamics in mediaeval versus modern times, we performed a simulation of analogical growth dynamics by transforming mediaeval data into modern WHO growth charts. Results of this experiment display no significant growth retardation for the investigated subadults. Although HLs were observed in 50% of the investigated individuals, a statistical significant correlation with possible growth deficiency was not assessed ($p = 0.113$). We assume that the approved long bone regression formulas are not biased by the selected subsample and definitely valid for reliable age estimation of subadults from medieval St. Polten.
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Child's play: the identification of skeletal trauma in immature human remains

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The study of skeletal trauma in immature human remains is considered problematic in the discipline of human osteology. This might be explained by the lack of specialized knowledge on trauma in children. Some fracture locations and fracture types are specific to childhood, and yet the skeletal manifestation of trauma in children has never been properly defined. This talk will first discuss skeletal trauma in children and its forms, and explain how knowledge of modern clinical literature led to the development of a methodology which can be applied to the study of dry bone. This methodology consists of strategies for identifying trauma macroscopically or through radiography. To apply this methodology, a large collection of immature remains (0-18 years) was derived from four medieval collections. All individuals were recorded forage, preservation and relevant pathology in addition to main observations on skeletal trauma. Results will illustrate the unique properties of skeletal trauma in immature remains, and reveal how the use of a modified methodology led to the identification of several fracture types. This talk will conclude with remarks on how these findings will fit into future research, and how they will contribute to the general paleopathological study of immature human remains.

A possible case of Möller-Barlow disease from northwestern Switzerland (7th century)

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The excavation site Reigoldswil is located at 550 m above sea level on the Jura chain hillside in north-western Switzerland. The mountains divide the Rhine valley from an agriculturally rich region. The origin of the village lies in the early medieval time. Until now the skeletons of one cemetery have been

morphologically studied. Around 216 individuals were excavated from under the foundation walls of a church and in the open field. They date to the 7/8th up to the 10th century. The striking part is the high amount of subadult (0-18 years) individuals with 58% (n=126). One of these children, an approximately 1.5 year old toddler from the 7th century, was buried in a stone cist. Its bones show morphological traces like porotic lesions of the greater wings of the sphenoidale, the squama, the mandibule and the scapula as new bone formation on both femora and tibiae. These signs could be an indicator for Möller-Barlow disease (Ortner 2003, Brickley and Ives 2008, Stark in press). As scurvy is associated with an insufficient intake of vitamin C, malnutrition must be assumed. A reason might be the geographic location or/and a harsh climate with crop failure and famine the first settler had to face. Besides the morphological diagnose amino acids of the bone collagen have been analyzed (Kramis et. al.). Further examinations, such as radiocarbon dating and stable isotope ratios (C, N, O, S) to specify nutrition, are planned.
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Protocol optimization to detect G6PD deficiency in ancient samples

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Malaria has been for many centuries one of the most severe diseases affecting European populations, especially around the Mediterranean shores. It is hypothesized that natural selection by malaria has made more impact on human genes than any other pathogen: the distribution of *P.falciparum* malaria worldwide has shown to be correlated with the distribution of different human genes mutations which appear to give resistance to malarialinfection.G6PD deficiency is one of the most well -known examples of human mutations likely caused by malaria. Nowadays G6PD deficiency is more frequent in the countries where *P.falciparum* malaria has been endemic for many centuries. In Europe G6PD deficiency is particularly present around the Mediterranean coasts, where malaria has infected people for a long time, and the Italian island Sardinia is the European region with the highest frequency of G6PD deficiency. However, G6PD deficiency is not so common in other former malarial regions, especially in neighboring Corsica. Many hypotheses have been posited to explain these exceptions. Corsica, France, has, in spite of its long malaria history and its position close to Sardinia, very few cases of G6PD deficiency. G6PD deficiency is also rare in Central and Northern Europe. Switzerland, for instance, confines with Italy, where G6PD frequency is rather high and which was in the past colonised by Romans. Despite this closeness, G6PD deficiency seems to be rare in Switzerland. Here there will be presented the preliminary human genetic results on historical Sardinian and Swiss samples.

Dental modifications in a skeletal sample of enslaved Africans found at Lagos (Portugal)

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In 2009, an archaeological intervention in the Valle da Gafaria (Lagos, Portugal) allowed the excavation of a deposit of waste dating from 15th-17thcenturies. Among discarded objects and food remains, an important amount of human skeletal remains was exhumed (N=158 individuals). The archaeological and historical context of the findings, as well as the morphometric analysis of the skulls led us to attribute an African origin to these individuals. Historical sources document the capture and trade of slaves by the Portuguese since the 15thcentury. While this trade has expanded over time, so far no slave cemetery was excavated in Portugal. The study of their lives and deaths has been accomplished primarily by historical

documents. Therefore, this sample provides a unique opportunity to learn more about captive individuals who were brought to Portugal in the modern period. The present work focuses in the intentional dental modifications presented by several of these individuals. A total of 113 subjects have teeth that can be evaluated for the presence of intentional modifications. Of these, 63 (55.8%) individuals present dental modifications on their anterior dentition. Twenty-seven individuals (42.9%) exhibit modifications on both upper and lower teeth. The incisors were the most frequently modified teeth, followed by the canines. Both men and women as adults and sub-adults have dental intentional modifications. In most individuals dental modifications involved the removal of the mesial and distal angles of the teeth, which is comparable to practices observed in sub-Saharan Africa today. However, we cannot infer a more specific origin for these slaves only based on dental modification's type and pattern because several ethnic groups modify their teeth in the same way.

Growth problems in a skeletal sample of children from the foundling wheel of Santa Casa da Misericórdia, Faro, Portugal (16th -19th centuries)

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During growth, each child has a genetic potential for increasing in size and shape, the attainment of which depends upon different conditions related to stress. A basic assumption is that dental development is less influenced by environment than skeletal development, being considered the best indicator of chronological age in skeletal remains. Therefore, the difference between skeletal and dental development may provide a measure of growth and health in a given population. In 2006, an excavation brought to light the cemetery of Santa Casa da Misericórdia de Faro, Portugal (16th-19thcenturies) with several phases of funerary use, one of them with 51 non-adult individuals, corresponding to new-borns received in the institution by foundling wheel's mechanism means. Such a skeletal sample offers a unique opportunity to compare the pattern of skeletal and dental development of immature individuals exposed to severe environmental insults. For this purpose, age-at-death was estimated through skeletal and dental analysis. Furthermore, a paleopathological analysis of the sample was conducted. The obtained results show a difference between dental and skeletal ages, giving the skeletal methods younger ages than the dental ones, suggesting a delay in skeletal development. Such difference increased with age, which is consistent with a cumulative effect of growth constrains. The results are in accordance with severe environmental conditions, expected in an orphanage where food and hygiene were scarce. Regarding paleopathology, the high frequency of porotic injuries and new bone deposition, particularly in the skeletons previously identified as small for their age, corroborate the poor conditions experienced by the Santa Casa's orphans.

Childhood development and adult longevity in archaeological British populations (AD950-1855)

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Through the recording of multiple skeletal and dental indicators of non-specific stress (linear enamel hypoplasia (LEH), reduced diameters of the vertebral neural canal (VNC), and short femoral lengths) it is possible to create a chronology of childhood health insults which covers the post-natal period of development from around 6 months of age until growth completion. When applied to samples of adult skeletons the age-at- death distribution of the various stress markers can reveal how disruptions during specific periods of childhood development affected long-term health in past populations. This method was applied to adult skeletons from Barton-upon-Humber, Lincolnshire (n=467), and 13 London cemeteries (n=956). Individuals who died between 18-25 years of age had smaller VNC diameters than individuals who lived into older adulthood ($p<0.04$). LEH and femoral lengths did not show a consistent

relationship with age-at-death. That these findings were observed in males and females from both skeletal samples and in all cemetery periods attests to a common biological mechanism which was not moderated by changing environmental conditions. It is therefore suggested that the disruptions which constrained VNC growth were chronic in nature and affected the long-term functioning of the immune system, while enamel defects were caused by brief disruptions which did not have a long-term impact on health.

Brave New World of Agriculture in Southern Scandinavia. Better health for everyone?!
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Although considerable research has been devoted to general health effects of the foraging-to-farming transition in Southern Scandinavia, rather less attention has been paid to the health challenges specifically women experienced during that time. The working thesis for the Ph.D. study is that women have been more affected by health risks during transitional phases due to "physiological and hormonal changes that occur during their lifespan" (Fields et al. 2009) as men. With the transition to agricultural subsistence new tasks and hazards appeared. Sedentism led to higher fertility rates and reduced birth intervals, referred to as the Neolithic Demographic Transition (Bocquet-Appel 2002), while concurrently great burdens were imposed on the bodies of Neolithic women. Starting point for this Ph.D. study is the archaeological and anthropological material of Mesolithic and Neolithic Southern Scandinavia. By observing not only the skeletal sample for typical palaeopathological health indices (e.g. enamel hypoplasia, harris lines, degenerative joint diseases) but also the biocultural and environmental conditions of the populations' health a more detailed comprehension will be available for possible health consequences in prehistory and history. Knowledge of prehistoric health is of great importance for later analyses of life expectancy and demography.
References: [1]Bocquet-Appel JP (2002) Paleoanthropological Traces of a Neolithic Demographic Transition. Current Anthropology 43(4): 637-50. [2]Fields M et al.(2009) Sex and the agricultural transition: Dental health of early farming females. Journal of Dentistry and Oral Hygiene 1(4):42-51.

Digital methods for analysis, visualization and documentation in paleopathology
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Digital methods have gained increasing importance in order to document, visualize and analyze osteological data in recent years. Up til the last few years the principal utilization of these resources has been confined to special cases and been focused on documentation and visualization. In pathology for example projects such as digitized diseases (www.digitizeddiseases.org) have integrated3D modeling in an online reference resource with visualization a primary objective. For osteology as a discipline thes e new (and currently quickly developing) digital technologies have a great potential to aid and develop the osteological analysis in preserving, accessing and analyzing information. In working with different and diverse forms of 3D modeling (laser scanning, photogrammetry and 3DGIS) different potentials can be recognized to aid and enhance the osteological analysis being time efficient without being technically or financially demanding. The different methods can be useful in different respects both in the lab, specifically for paleopathology and in the field to help to integrate the osteological analysis with the archaeological context. This discussion is illustrated by specific cases involving the different methods in order to describe the potential as well as results and experiences derived from them.

Hip disorders in prehistoric populations of Austria
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Changes of bone architecture resulting from long survived hip disorders are rarely seen today, because these hip disorders are usually corrected immediately by physical or mechanical treatments like extra

diapering of babies, fixations of displaced parts during puberty, and in case of permanent destruction by joint replacements. In archaeological context we do find bone formations from mostly untreated hip disorders which led to a long term rebuilding process due to the daily mechanical load. The most remarquable outcome is a mushroom like femoral head or a shallow hip joint. Different causations can lead to these deformations of the hip joint like osteoarthritic changes, Legg-Calvé-Perthes disease, slipped capital femoral epiphysis, ischemic necrosis, secondary osteoarthritis, idiopathic coxa vara and neurological disorders. Even though the morphological changes are pretty obvious, these disorders of the hip are rarely seen in remains of prehistoric populations. In this presentation an impressive case from RomanPeriod in Klosterneuburg will be demonstrated and the differential diagnosis will be discussed. In addition results from cases with hip deformations in a Celtic (450-300 BC) group from Dürrnberg and from the Avar Period (630-800 AD) are presented and set into context with published data of hip disorders from Roman Period (200-400 AD). Prevalence rates and diagnostic criteria are discussed. In any of these prehistoric groups from Austria hip joint deformations are rare disorders. Nevertheless we show that such data can be used for population studies as well as for discussion of possible social impacts to the individuals of these populations.

A Probable Case of Mucopolysacchridosis in Medieval Skeleton from South Korea

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Mucopolysaccharidosis (MPS) is a group of heritable diseases characterized by biochemical abnormalities in the mesenchymal cells, mainly fibroblasts and chondrocytes that synthesize mucopolysaccharides. To date, cases of MPS are very rare findings in archaeological skeletons. The skeletal dysplasia by MPS has never been elaborately examined. The purpose of this research is to report a probable case of MPS in a burial from the Eunpyeong cemetery site, Seoul, South Korea. In order to examine the pathological lesions of the skeleton, marcoscopic examination and radiographs and CT-scans analysis were carried out. The specimen consists of the cranium, mandible, and some portions of the upper limbs. The skull is brachycephalic with very pronounced frontal and parietal bossing. The humerus of the individual shows severe pathological changes, affecting both the diaphysis and the epiphysis. The both humeri are abnormally short with excessively angulated deltoid tuberosity. The humeral heads have severe malformation of the articular surface with pitting of the subchondral plate. The heads are irregular and rugged on its surface and there are deep cavities in its center. Moreover, the head of the left humerus is directed posteromedially so that the posterior surface of diaphysis is displaced medially. The general appearance of the both humeri is undoubtedly indicative of achondroplasia. However, the abnormal morphology of the humeral heads suggests an almost complete failure in the development of the epiphysis. This aspect is more compatible with conditions seen in mucopolysaccharidosis.

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Intestinal Parasites in a mid-14th Century Latrine from Riga, Latvia: Fish Tapeworm and the Consumption of Uncooked Fish in the Medieval Eastern Baltic Region.

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The aim of this study was to investigate faecal material from a medieval latrine in the coastal town of Riga (Latvia) in order to identify the intestinal parasites present within the population. We identified large numbers of the eggs of three species of parasitic intestinal worms that affect humans - fish tapeworm (*Diphyllobothrium latum*), whipworm (*Trichuris trichiura*), and roundworm (*Ascaris lumbricoides*). The fish tapeworm evidence demonstrates that the population was eating large amounts of uncooked fish (perhaps raw, smoked, or pickled) since cooking prevents parasite transmission. ELISA analysis identified the presence of the parasite *Entamoeba histolytica*, which causes dysentery in humans, and Entamoeba cysts were also noted on microscopy. Scanty numbers of eggs from parasites affecting farm animals were also identified, namely horse pinworm (*Oxyuris equi*), a protozoan parasite that affects of poultry, cattle, and rodents (*Eimeria sp*.), a nematode worm of ruminants (*Strongyloides papillosus*) and a flatworm of ruminants (*Paramphistomum sp*.). This shows that either that the human population was eating animal intestines (offal), or that a small amount of animal dung found its way into the latrines. We discuss the implications of these findings for our knowledge of intestinal parasites in coastal areas of the medieval Baltic region, of food consumption, of hygiene, and of the affects of the parasites upon the health of those living in medieval Riga, the most important city in the crusader state of Livonia.

Molecular analysis of possible brucellosis cases from different sites in Southwestern Germany

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Brucellosis is a disease that is generally difficult to diagnose in paleopathological specimens. Several morphological alterations, in particular lytic lesions at the anterior vertebral bodies, have been discussed to be potentially specific for an infection with pathogens of the genus Brucella. However, other infectious diseases, such as tuberculosis may show similar morphological changes. The aim of this study was to analyze possible brucellosis cases with molecular methods, in order to compare morphological alterations with the genetic evidence for either brucellosis or tuberculosis. We have analyzed a total of six skeletons originating from the Early Medieval sites of Sulz am Eck (4), Niederstotzingen(1) and the Neolithic site Schwieberdingen (1), all located in South-Western Germany. All skeletons showed morphological alterations that were assigned during differential diagnosis to probable brucellosis infections. For the molecular analysis samples were taken from all skeletons and analyzed in our ancient DNA facility in Bolzano, Italy. Following DNA extraction the specimens were tested with primers amplifying different specific genetic regions of Brucella pathogens and the Mycobacterium tuberculosis complex. Positive amplification products were subsequently sequenced and the results were compared to available databases. Two out of the four samples form Sulz am Eck and the case from Niederstotzingen were negative for brucellosis, but were tested positive for tuberculosis. The Neolithic specimen from Schwieberdingen provided some molecular evidence for both infectious diseases. Further genetic analysis are planned, in particular next-generation sequencing, to get a better picture of the presence of different pathogens in these samples that probably will help to establish specific paleopathological criteria for the detection of brucellosis in ancient skeletons.

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