

The Fifth International Conference of the ICAZ Animal Palaeopathology Working Group

**Osteoarchaeological Research Laboratory, Department of Archaeology and Classical
Studies, University of Stockholm, Sweden.**

Patterns of skeletal pathology in wild and domestic animals in the past and present

Presentations (in alphabetical order)

Title: *Spatio-temporal patterns in absent/reduced hypoconulids in mandibular third molars amongst domestic cattle in north-west Europe: a preliminary investigation and some speculations*

Authors: Thierry Argant (Archeodunum, France), Richard Thomas (University of Leicester, UK), James Morris (University of Central Lancashire, UK)

Abstract: Cattle with absent or reduced hypoconulids of the mandibular third molar are routinely recovered on archaeological sites. Up until now, however, attempts to map their distribution through space and time have been limited. In this paper we present preliminary results of an investigation of diachronic changes in the frequency of this trait on archaeological sites in France and England. This study reveals that this trait is concentrated through space and over time. In Britain, it seems to be much more common on Roman sites, but then declines in frequency until the early medieval period; by the late medieval period the frequency of this character increases significantly again. In France, the proportion seem to increase from the Iron Age until the first century AD. Explanation of these observations need much more data, but we speculate that the higher proportion in Roman times may reflect the introduction of new (larger) stock following the Roman occupation which carried this character in higher frequencies. This would imply that the character is inherited (recessive) and that its subsequent decline is a consequence of outbreeding. Following this line of argument we consider whether the new stock arriving to Britain were sourced in Gaul, where the trait was more frequent before Roman colonisation.

Title:TBA

Author: László Bartosiewicz (The University of Edinburgh, UK).

Abstract:TBA

Title: Beyond skeletal pathology: identifying patterns of epizootic disease in archaeological livestock

Author: Annelise Roman-Binois (Université de Paris, France)

Abstract: For obvious reasons, research in animal paleopathology has until recently essentially focused on the study of skeletal lesions. The best part of the multiple diseases and accidents which can affect livestock do not, however, leave any trace of their passing on the bones of their victims, and can therefore not be approached by traditional paleopathological methods. This is in particular true for most causes of animal mass mortalities, including those related to epizootic disease. Though uncommon, archaeological deposits that can be related to such events do however exist, and have until yet been little studied from a paleopathological angle. This presentation aims therefore, through the examples of two French sheep-carcass deposits dating from the medieval and modern periods, to offer methodological avenues for the analysis of mortality events in domestic livestock. We suggest that the differential diagnosis can be addressed by an epidemiological approach: by cross-referencing historical sources and modern veterinary data, it is indeed possible to establish a list of the most frequent historical causes for mass mortalities among sheep and to outline each cause's epidemiological profile. The comparison of each deposit's characteristics with the profiles can therefore give an indication of the most probable causes for the deaths.

Title: *Spinal/pelvic pathology and its role in interpreting riding use: a cautionary tale.*

Author: Pam Cross (University of Bradford, UK)

Abstract: Understanding what use or activities are responsible for changes in bone morphology in the human or animal skeleton is a holy grail area of palaeopathology. It is a subject widely pursued amongst human palaeopathologists and zooarchaeologists are keenly interested in identifying possible draught usage amongst domestic animals. In the case of the horse, identifying riding use is also of interest, not only to zooarchaeologists but to a wide audience including historians (especially military historians) and horse enthusiasts. Draught/riding use is generally inferred from the identification of bridle/bit use and/or changes to the spine, particularly to the lumbosacral vertebrae. Unfortunately, like finding the grail, associating any one cause to skeletal changes is difficult to achieve. This presentation discusses the typical palaeopathic methods used for identifying riding and the inherent problems and issues. Known history specimens will be used to investigate the reliability of these methods.

The extensive study of activity-related skeletal change by human palaeopathologists shows that this is a difficult subject area, and one often subject to over-confidence. In that field, only highly specialised activities resulting in a suite of skeletal changes have been reliably identified. The changes associated with riding are not unique to that activity. Moreover, the

best 'evidence' is likely to be the result of poor horsemanship, equipment fit and/or underlying conformational defects. This in mind, it may need to be accepted that riding use can only be one of a possible group of causes when attempting to identify riding in equid skeletons without additional finds evidence.

Title: *Pathological conditions identified on the animal bones from the Early Bronze Age site of Kaposújlak–Várdomb (South-Western Hungary).*

Author: Erika Gál (Archaeological Institute of the Hungarian Academy of Sciences, Hungary).

Abstract: TBA

Title: *Health conditions and death history of horses and dogs in the Viking Age - illustrated by bone samples from the Oseberg and Gokstad ships.*

Author: Anne-Karin Hufthammer (Bergen University, Norway)

Abstract: A significant number of horses and dogs have been identified in bone assemblages found in the Viking ships Oseberg and Gokstad; in the Oseberg ship at least 14 horses and 4 dogs and in the Gokstad ship approximately 12 horses and 8 dogs. Many of the horse and dog bones show pathologies and trauma. This study discusses the pathology, the information they provide to the life history of the two species and what the trauma can reveal about burial rituals in Viking Age Norway.

Title: *Castrated pigs and healthy cows? -palaeopathological changes in canines of pigs and in the lower limb bones of cattle from Iron Age Uppåkra, Sweden*

Author: Ola Magnell (Riksantikvarieämbetet, UV, Sweden)

Abstract: Palaeopathological changes of animal bones from the settlement Uppåkra have been analysed in order to study the animal husbandry practice at central places during the Migration Period in South Scandinavia. Several upper canines of pigs have normal morphology of the tips of the tusks, typical of boars, followed by evidence of severe enamel hypoplasia caused about 12 months of age. The disturbances of tooth formation have stopped and the canines have got roots, typical of sows, and the animals have been slaughtered about 18-24 months of age. The pathological changes of the canines have been interpreted as caused by castration in order to enhance the fattening of the pigs before slaughter. Further, the metacarpals, metatarsals and phalanges of cattle been studied to detect pathological changes of the joints. A relatively low frequency of changes indicates that few of the cattle brought to the settlement for slaughter were draught animals.

Title: *Dental attrition and pathology of horses from the Iron Age burial site Levänluhta in Ostrobothnia, Finland*

Authors: Kristiina Mannermaa (University of Helsinki, Finland) and Suvi Viranta-Kovanen (University of Helsinki, Finland)

Abstract: The water burial site of Levänluhta in Isokyrö, Ostrobothnia c. AD 300-800, has the largest prehistoric sample of unburnt human and animal bones in Finland. Scattered bones from almost hundred of human individuals, animal bones and some artefacts represent grave goods and can be dated mainly to the Merovingian period (AD 550/600–800). The animal osteological material from Levänluhta consists of c. 4.2 kg bones or bone fragments of which c. 3 kg are from horses. Bones derive from at least five individuals. The anatomical distribution indicates that horses were buried complete. Preliminary size estimates suggest that they were small horses (two individuals with withers height 121.8 and 122.3 cm).

In this paper we present an analysis of wear patterns and possible pathologies on the Levänluhta horse teeth. Scattered teeth represent individuals with age range from a probably 2 year old to a mature horse. Abnormal dental wear patterns are present. One premolar has a very dominant rostral hook and several molars have wave complexes. We use our findings in interpreting use and diets of horses buried in Levänluhta.

Title: *The dangers of an urban environment: a survey of animal paleopathology from Londinium*

Author: James Morris, (University of Central Lancaster)

Abstract: This paper presents the results of a City of London Archaeological Trust (CoLAT) funded project synthesising animal paleopathological information for Londinium, Roman London. Since the early 1990s Museum of London Archaeology zooarchaeologists have been recording pathological specimens into an Oracle faunal database, this project is part of a number of attempts to synthesise this important dataset. After cross-referencing with stratigraphic and pottery datasets to ensure samples were from securely dated contexts, a sample of 770 pathological specimens was identified from a total sample of 95,046 elements, from 60 excavations. Although this indicates a very small percentage of the overall assemblage, 0.68% had pathological changes present. Paleopathology was much more common on certain species, in particular over 3% of the pig and chicken assemblages displayed pathological change, perhaps related to husbandry practices. This paper will explore the results of the project considering the problems and potential of utilising legacy datasets and how such synthesis projects can inform on wider archaeological issues.

Title: *Horse pathology caused by human handling of the domestic horse.*

Author: Torstein Sjøvold (Stockholm University, Sweden)

Abstract: In veterinary textbooks it is rarely mentioned that costal cartilages ossify. Fairly recently it has been demonstrated that the costal cartilages in the horse do not only calcify but even frequently fracture, although the fractures observed are healed. Where to draw the difference between calcification and ossification may be a matter of discussion, but in the horse all cartilage has been replaced by osseous matter at the age of five. Apart for illustrations of some few costal cartilages and somewhat erroneous descriptions in textbooks, the shapes of the 18 cartilages in the horse are hardly known, nor the individual shapes and the relations between them.

Initially it is difficult to explain why ossified costal cartilages fracture. Because healed fractures have been observed in feral, mammalian artiodactyl species, it may appear that some can result from aggression during breeding seasons. But even other, random events during an animal's life may cause fractures to occur, both concerning feral and domestic animals. The domestic horse has a special position in this respect because the wide range of uses in human service. In order to study whether some of the fractures observed in the domestic horse could be the result of human handling, fracture patterns of cartilages from disarticulated skeletons of 100 Norwegian horses with known age and race were compared with chest radiographs of two modern, domestic Australian horses and 18 feral, so-called "Brumbies", descendants of horses which have escaped from Australian farms and are now living in great numbers without any human control in the interior of Australia. Although fractures were observed in the Brumbies and the two Australian domestic horses, the pattern was different from that observed in the Norwegian, domestic horse, indicating that some kinds of fractures are most likely due to human handling.

Title: *Radiographic interpretation: radiography of cattle metapodials with skeletal changes.*

Author: Ylva Telldahl (Stockholm University, Sweden).

Abstract: This paper presents the results of conventional X-ray analysis of cattle metapodials to investigate the age structure of slaughtered cattle at Eketorp ringfort on the Island of Öland, Sweden. Furthermore, dual-energy X-ray absorptiometry (DXA) was used to evaluate a possible connection between bone density and age, sex and presence of skeletal lesions in cattle metapodials. The X-ray analyses show that few female cattle reached an advanced age while many animals in both phases seem to have been slaughtered aged 4-8 years. More

male cattle reached an advanced age of over 8 years but in phase III more male cattle seem to have been slaughtered between 2 and 8 years of age. The differences probably reflect a change in breeding strategies related to the character of the site. The results of the bone density study showed that archaeological specimens exhibited lower values than modern elements making the evaluation of post-depositional changes difficult. Archaeological metatarsals exhibited greater values than the metacarpals. The mean BMD values were higher in both metacarpals and metatarsals from cattle over 8 years than those from younger cattle. Mean BMD values were also greater for oxen or bulls than those for cows. There is an association between the presence of pathology and higher BMD values in both metacarpals and metatarsals, possibly indicating an association with the use of draught animals.

Title: *The Chillingham herd of feral cattle and their relevance to palaeopathology*

Author: Richard Thomas (University of Leicester, UK)

Abstract:

Title: *Paleopathology of Archaic and post-Archaic period dogs from the U.S. Midsouth and Southeast.*

Author: Diane M. Warren (University of Oklahoma, USA)

Abstract: In historic times, Native Americans in the midsouthern and southeastern United States used dogs in a variety of contexts including for protection, for companionship, for hunting, for garbage disposal, for ritual purposes, and as food. By contrast, there is little evidence for burden bearing. The extent to which dogs played these roles in prehistoric times is unclear. Here, I use paleopathology to examine dog use and activity at Archaic through Mississippian period sites in Kentucky, Tennessee and Alabama (roughly 8000 BCE - 1500 CE). Most of the 260 Archaic and 68 post-Archaic dogs represent deliberate burials of fully articulated individuals. The post-Archaic dogs had higher frequencies of facial, rib, and L5 vertebral spinous process fractures, although skull and vertebral fracture frequencies were high across time. Vertebral marginal osteophyte patterning suggests different spinal stresses in the Archaic dogs and post-Archaic dogs. Although comparative data are limited, these patterns also appear different from modern foxes and non-working dogs. Whereas the vertebral pathologies might be due to burden-bearing, the scapula injuries proposed as markers for burden-bearing in dogs were rare. Human abuse and fights between animals might also underlie the high frequency of skull, rib, and vertebral fractures. Other notable results include significantly more older, male dogs buried in versus outside of human graves, and little change over time in shoulder height and age at death.

Posters (in alphabetical order)

Title: *Wild artiodactyl dental development pathology: two prehistoric case studies from France*

Authors: Annelise Roman-Binois (Université de Paris, France), Anne Bridault (CNRS, France), T. Ducrocq (INRAP, France), G. Pion (ADRAS, France)

Abstract: Dental development anomalies are among the oral affections most frequently encountered in animal paleopathology, and numerous cases have been described in various domestic species. This type of data is however less common in wild animals and is even rarer for prehistoric times. We therefore propose to present two prehistoric cases of dental development anomalies identified in artiodactyls from France. The first specimen originates from an Early Azilian level dated to 12,200-11,400 cal. BC from the site of La Fru (Savoie), and was identified as mandibular compound odontoma of deer (*Cervus elaphus*). Although odontomas are of benign nature, the anatomical position of this specific mass probably impacted the animal's ability to browse, and therefore its general health. This specimen therefore raises the question of the place of weakened animals in the hunting strategies of the site's inhabitants. Our second specimen is the sub-complete skull of a wild sow presenting an anomalous tooth row on the left maxillary. The second upper permanent premolar is duplicated and the socket for the first upper premolar shows an abnormal peg-like shape. This skull was recovered in a pit on the Mesolithic site of Blangy-Tronville "La Petite Tête" (Somme) in association with lithic material regionally documented between 8,600-7,600 cal. BC. This type of dental anomaly, common in domestic animals, has often been linked to founder effect or to co-selection by selective breeding. This specimen reminds that this is not always the case.

Title: *Palopathological changes in an early Iron Age Horse skeleton from the central Balkans, Serbia.*

Authors: Jelena Bulatović (Belgrade University, Serbia), Aleksandar Bulatović (Belgrade University, Serbia) and Nemanja Marković (Belgrade University, Serbia)

Abstract: During the rescue archaeological excavation in 2012 at site Ranutovac-Meanište near Vranje, southern Serbia, remains of the Early Iron Age (Hallstatt B-C) settlement were revealed. In one of the settlement pit a complete horse skeleton was discovered. The skeleton is that of a mare, based on the shape of the pelvis and the presence of small

vestigial canines. Analysis of lower incisor wear indicate an age of around 4 to 5 years of death. On this poster, paleopathological changes in horse skeleton are described and used to interpret the possible use of the animal. Several paleopathological changes are recorded in the spinal column, particularly in thoracic vertebrae 10–17, and lumbar vertebrae 1. Paleopathological changes in fore-limbs are restricted to the lower leg bones (the metacarpals and the first phalanges). Bone changes in hind-limbs, beside the metatarsals and the first phalanges, are also observed in the left thigh bone, and both shinbones. These paleopathological changes were caused by chronic inflammation of ligaments as a consequence of the intensive exploitation of animal, most likely riding.

Title: TBA

Author: Brooklynne 'Tyr' Fothergill (University of Leicester, UK)

Abstract:

Title: *Vycanny Dalesman's Kirstie: a cautionary example of skeletal anomalies, often used for the interpretation of archaeological draught oxen, in the skeleton of a Dexter cow of known life history.*

Author: Gidney, L.J.

Abstract:

Title: *A methodological approach for the study of animal palaeopathologies: the case studies from medieval sites in Northern France*

Authors: Akiyo Herledant (Muséum national d'Histoire naturelle and CNRS, France) and Jean-Hervé Yvinec (CHRS, France)

Abstract: Sanitary aspects of environmental living conditions of animals in past societies are often poorly known. This is mainly due to the lack of bone pathologies analysed, which can offer evidence on such aspects. This paper will present the results obtained during a master's level research project. In this research, several methods, used to study palaeopathologies of bones were applied and compared. A specific method proposed by Vann and Thomas for the recording of palaeopathologies was used. It helped to define an accurate protocol of analysis. Technical imagery analyses are also important for sample observation and recording of pathologies. To analyse the internal structure of pathological bones, we performed computed tomography scan (CT-scan) and three-dimensional reconstructions. Finally, two archaeological assemblages of northern France (Epernon and Orléans), which provide the biggest sample of pathologies, were studied. Those results show

the importance of this kind of analysis for exploring the individual history of domestic animals as well as the history of the treatment they underwent.

Title: *TBA*

Author: Minghao Lin (University of Cambridge, UK)

Abstract:

Title: Pathology in domestic mammals from the roman settlement at Niculitel (Romania)

Authors: Simina Stanc (Al. I. Cuza University, Romania) and Luminita Bejenaru (Al. I. Cuza University, Romania)

Abstract: Chronologically, the Niculitel settlement is dated to the second and third centuries AD.; its abandonment is dated to the middle of the third century AD., in the context of Carpo-Gothic attacks. A number of coins were found, the earliest being issued during the reign of Antoninus Pius, but most are of the Severan dynasty (Septimius Severus, Caracalla and Geta). Among the animal resources, domestic mammals constitute the majority; animal husbandry was an important subsistence activity for the inhabitants of the settlement. Cattle dominate the assemblage; other identified domestic mammals are: *Sus scrofa domesticus*, *Ovis aries*, *Capra hircus*, *Equus caballus*, and *Canis familiaris*. Most of the pathologies were observed on cattle bones: exostoses of the proximal and middle phalanges, a calcaneus, a distal metatarsus; fracture callus at the proximal phalanx; inflammatory processes within mandibles (in the area of the molar M3); abnormal erosion of lower molar M1. Signs of the use of cattle for traction were also observed: the distal articular surfaces of metapodials were strongly widened. This work was supported by a grant of the Romanian National Authority for Scientific Research, CNCS – UEFISCDI, project number PN-II-RU-TE-2011-3-0146.

Title: *Healed fracture of an Iron Age cattle femur*

Authors: Mircea Udrescu (Royal Belgian Institute of Natural Sciences, Belgium) and Wim Van Neer (Royal Belgian Institute of Natural Sciences, Belgium)

Abstract: Healed fractures of long bones of large mammals are rarely encountered in archaeozoological assemblages. Survival chances of large domestic mammals (cattle and horse) suffering from a femur fracture are limited, in particular in adult individuals. Today, treatment of this type of trauma is only rarely practised, mainly in juveniles. We report here

on the healed fracture observed in the middle of the shaft of a cattle femur from Wange, an Iron Age site in Belgium. Using external observation and X-ray images, the specimen is described paying particular attention to the effects of the consolidation, i.e., the displacement of the ends and the shortening of bone. Similar fractures seen in femurs of a modern eland antelope (*Taurotragus derbianus*) and of a modern gorilla (*Gorilla gorilla graueri*) are described and their relevance for the interpretation of the archaeological specimen is discussed.

Title: Skeletal pathologies of ringed seals (*Pusa hispida* Schreber, 1775) from ancient settlements of the sea-hunters (Chukotka, Russia)

Authors: D. Vasyukov (A.N. Severtsov Institute of Ecology and Evolution, Russia) and E. Gorlova (A.N. Severtsov Institute of Ecology and Evolution, Russia)

Abstract: We investigated osteological remains of ringed seal (*Pusa hispida*) from three ancient sea-hunters settlements situated on the western coast of the Bering Strait and the Chukchi Sea (the Chukchi Peninsula, Russia). Radiocarbon dates suggest that the settlements existed about 2300-200 yrs BP. Seals (mostly ringed seal - *Pusa hispida*) dominated in the mammal fauna during the whole period. The materials we investigated had originated from the deposit of kitchen waste; hence all the bones belonged to the animals killed by hunters. We have analysed over 11,000 bone fragments of all the skeletal elements except ribs, phalanges and vertebrae (except the first two cervical and sacral) paying attention to pathologies. Skeletal pathologies occurred to be only in 0.3% of all bones. We determined five main types of bone pathologies, at least four of them had occurred during animal life (as a result of accident, illness or age-related changes). First pathology type is fractures. We found few bones with traces of healed fractures. In all occasions these were the traces of serious fractures with luxation. All of them were fixed on the hind limbs – on crus and metatarsals. Probably, such injuries were due to the attacks of predators (the killer whale, bear or humans) when the seal managed to escape using the front limbs. In the second, we identified that vital loss of teeth is not characteristic of the ringed seal in contrast to the bearded seal, for example. Such cases are extremely rare, and probably also a consequence of injury. We have also identified several cases of osteolysis - destruction of cortical bone caused by inflammatory processes. Typically such damages occurred at the articular surfaces. Fourth type of pathologies is osteophytes. It's the most common abnormality. Probably for the ringed seal their appearance is associated with age, as far as all the cases of osteophytes were found on the bones of adult or old animals. Finally we determined three cases of increases in the number of molar teeth roots. These cases of anomalous development may be an atavism from the heterodont predatory ancestors of pinnipeds. Considering all above we suppose that the pathologies we found were not the cause of death of their owners. If the pathologies we found had made animals the easier prey for hunters, we would expect a higher percentage.