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# Archaeology Research Grant 2022

Judith Findlater\_ Final report

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1. Title: Ms

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3. Grant programme Archaeology Research Grant

4. Year awarded 2022

5. Title of project Juvenile Kids in an Urban Medieval Town

6. Summary of report  
(Minimum allowed 100 words)

The report aims to provide an overview of the findings of the scientific analysis undertaken on a sample of juvenile animal remains (no. 30) that had been retrieved from excavations carried out in the medieval urban port town of Carrickfergus, Co. Antrim. The report is to inform on the use of Zooarchaeology by Mass Spectrometry (ZooMS) to confirm the species of the juvenile remains that had previously been derived using conventional methodologies of zooarchaeology, that is, using visual aids such as reference collection material and manuals. Also, ZooMS was used to scientifically identify the species of juvenile elements in the faunal assemblage that had been assigned to sheep/goat. It is notoriously difficult to differentiate between the two species in adults and morphological methods are unreliable. It is even more difficult to distinguish between the elements of lambs and kids due to the under-developed and unfused nature of the skeletal elements. The elements subjected to analysis and the results from ZooMS are shown in Table 1 as saved as Image 1. The photograph submitted as part of this report shows an example of the bones submitted for analysis and highlights the lack of identification features on typically found juvenile elements in a zooarchaeological assemblage.

7. Please provide two appropriate images



8. Please outline the objectives of the project

The objectives were to ascertain, using the scientific methodology of Zooarchaeology by Mass Spectrometry (ZooMS), the identification to species level of a sample of juvenile faunal remains taken from various excavations that had been carried out in Carrickfergus, Co. Antrim. The first objective was to use ZooMS analysis to confirm the species identification tentatively given on elements that due to size differences between the reference collection and that of the archaeological specimens themselves led to uncertainty. These differences were thought to have been due to variations of the age at time of death of the reference collection and archaeological specimens, however confirmation was sought through the analysis of ZooMS so that identification of the elements on which uncertainty arose could be sought.

The second objective focused on the juvenile remains that were identified as sheep/goat using conventional zooarchaeological visual techniques by examining the morphology of the bones/teeth present. Adult sheep/goat elements are difficult to distinguish using morphological and biometrical techniques although such methods do exist. No methods are available to enable the distinction between juveniles of the two species which leads zooarchaeologists to unsatisfactorily assign those elements as sheep/goat. This results in both sheep and goat husbandry remaining largely unstudied and poorly understood. This is unfortunate as these animals form a critical component of past livestock husbandry practices. Also included in the analysis were elements that were determined to be of medium-sized animals, that is likely to be sheep/goat, based on the relative frequency of the more mature specimens, but could also be pig.

The confirmation of the species present in the sample of juvenile remains submitted for analysis was to inform on the relative representation of lambs and kids within the sample which in turn would provide information on the socio-economic trends of juvenile species in a medieval faunal assemblage.

9. Please describe the methodology used in conducting the research

In order to scientifically identify the juvenile remains present in the sample material, the samples were sent to BioArCh, University of York for Zooarchaeology by Mass Spectrometry (ZooMS) analysis. Fragments were taken, weighing approximately 50mg each, by drilling a small part of each element. The sample site where the drilling was to take place, was selected to cause minimal damage to the skeletal element. The samples were submitted for ZooMS analysis where they were prepared in the laboratory to extract peptides (chains of amino acids found in proteins) from collagen samples (Buckley et al., 2009; Hendy, 2021, 1). Using a MALDI-time-of-flight (TOF) mass spectrometer, the 'fingerprint' of various peptides was analysed and through the comparison of the peptide masses generated, species identification was determined for each of the samples submitted (Hendy, 2021, 2).

10. Please outline the findings of your research and/or milestones achieved

The results from the ZooMS analysis confirmed the identification of two calf bones that were tentatively identified using morphological methodologies which fulfilled objective one. With regards to objective 2, out of 28 bones that were thought to be sheep/goat based on morphological indicators, 3.6% (no. 1) were identified as cattle, 10.7% (no. 3) as pig and 85.7% (no. 24) as sheep. The outline of this objective was to investigate the possibility that goats were bred in the urban medieval town of Carrickfergus to provide ready dairy supplies to the townspeople as evidenced through the presence of juvenile goat remains. However, from this sample of juvenile remains, the results indicated a complete lack of goats. The surprising results do not conclusively show that the original hypothesis is incorrect but rather informs that in the sample analysed there were no goats identified. The results suggests that conventional ideas of goat husbandry during the medieval period are incorrect. The idea of goats being reared in urban centres during this period to provide a ready supply of milk is a common theme (McCormick, 1997, 828; McCormick and Murray, 2020, 205; Murphy, 2003, 634; Murray, 2021, 35) which has arisen from the relatively high occurrence of female goat horn cores in urban sites. However, from these results it is clear that the breeding of goats may not have been as frequent in urban centres as previously thought. It would be of great interest to repeat this project methodology on morphologically identified juvenile sheep/goat remains from a similar site to see if the pattern of lambs dominating (and the lack of goat remains) is repeated. The lack of juvenile goat remains suggests that breeding of goats did not take place in the town of medieval Carrickfergus at any great level. It is also suggestive that neither kid meat nor kid skins were of sufficient importance and that the items were supplied to the town already butchered or prepared. The high number of juvenile sheep present may not just be due to the close proximity of the herds to the town but could have been due to the industry of producing lamb skins for items such as parchment for legal documents that would have been of vital importance due to the status of the town, port, and the associated castle during the period (McNeill, 1980, 9; McSkimin, 1909, 153). Another explanation for the relatively high number of lambs present in the faunal assemblages of the town could have been due to the large industry of exporting hides that have been evidenced in medieval taxes such as those of murage of other towns in Ireland that included lamb skins. It is entirely possible also that the lambs were naturally occurring mortalities of animals that were owned by the townspeople which were farmed in the areas of common land surrounding the town.

11. a) Please provide details of the dissemination of the outcomes from this project (inc. publications, presentations, outreach, media etc.) including details of any social media/web platforms used to publicise this project

The results from this project will be included in my PhD research. They will also be included in planned articles regarding the role of the goat in medieval Ireland, that will include various scientific as well as the morphological and biometrical analyses that have been carried out as a result of the PhD research.

e) How will you continue to communicate the results of your project and what are your publication plans?

My research into goats in medieval Ireland is to continue with the work I am undertaking on my PhD project and outside projects that include goats in prehistoric times. The results from this funded research project will continue to be utilised alongside the work that is ongoing.

15. How did the award enhance your professional development (e.g. in terms of specific opportunities, opportunities for enhancing skills, collaborations with others etc.)?

The award allowed me to gain greater insights into zooarchaeology and particularly of that of juveniles which without the award I would not have been able to gain. The award has also allowed me to gain greater knowledge of the animal husbandry of the medieval period and to question a common statement that has been used in literature with little scientific basis.

16. What plans (if any) do you have to further your proposal/project?

I would like to carry out this analysis on the juvenile remains from another medieval archaeological site so see if the lack of goats is repeated in that assemblage as well.

Ref	Element	Unfused	Age (after Reitz and Wing 1999, 76)	Fusion Stage	Teeth Age	ZooMS Results
J1	Tibia	Distal	Less than 24 months	Middle fusing		Pig
J2	Femur	Proximal	Less than 30-42 months	Late fusing		Sheep
J3	Maxilla	M3 erupting			21/24 months	Sheep
J4	Tibia	Proximal	Less than 42 months	Late fusing		Pig
J5	Femur	Proximal	Less than 30-42 months	Late fusing		Sheep
J6	Mandible	dp2 and dp3 present only			Less than 12 months	Sheep
J7	Ulna	Proximal	Less than 36-42 months	Late fusing		Sheep
J8	Calcaneus	Proximal	Less than 30-36 months	Middle fusing		Sheep
J9	Radius	Distal	Less than 36-42 months	Late fusing		Sheep
J10	Pelvis	Unfused ilium	Less than 6-10 months	Early fusing		Cattle
J11	Mandible	Porosity			No teeth present	Cattle
J12	Radius	Distal	Less than 36-42 months	Late fusing		Sheep
J13	Calcaneus	Proximal	Less than 30-36 months	Middle fusing		Sheep
J14	Mandible	Dp4 present only			Less than 12 months	Sheep
J15	Mandible	Dp2, 3, 4 present only			Less than 12 months	Sheep
J16	Radius	Distal	Less than 36-42 months	Late fusing		Sheep
J17	Tibia	Distal	Less than 15-24 months	Middle fusing		Sheep
J18	Mandible	M3 erupting			21/24 months	Sheep
J19	Metacarpal	Medial line just fusing		Early fusing		Cattle
J20	Radius	Distal	Less than 36-42 months	Late fusing		Sheep
J21	Metacarpal	Distal	Less than 18-28 months	Middle fusing		Sheep
J22	Ulna	Proximal	Less than 36-42 months	Late fusing		Sheep
J23	Metapodial	Distal	Less than 18-28 months	Middle fusing		Sheep
J24	Metacarpal	Distal	Less than 18-28 months	Middle fusing		Sheep
J25	Metatarsal	Distal	Less than 18-28 months	Middle fusing		Sheep
J26	Mandible	M3 just erupting			21/24 months	Sheep
J27	Calcaneus	Proximal	Less than 24 -30 months	Middle fusing		Pig
J28	Metatarsal	Distal	Less than 18-28 months	Middle fusing		Sheep
J29	Metacarpal	Distal	Less than 18-28 months	Middle fusing		Sheep
J30	Metacarpal	Distal	Less than 18-28 months	Middle fusing		Sheep

**Table 1 – ZooMS Results**