




Archaeology Research Grant Report

Name of Grantee:	Dr Merial McClatchie
Title of Project:	A new scientific approach to determine agricultural management strategies in medieval Ireland
Amount and year awarded:	€2,300 in 2020

<p>Summary of report:</p>	<p>The project aimed to determine agricultural practices in medieval Ireland through stable isotope analysis of charred cereal grains. This is a specialised scientific technique that is not carried out in the Republic of Ireland, but there is a centre of excellence for stable isotope analysis of plant remains at the University of Oxford. The applicant had planned to travel to Oxford to prepare the material for analysis, and then work with the lab team to run the analyses, but this travel could not take place due to Covid-related restrictions. Instead, the Oxford laboratory kindly agreed to prepare and analyse the material (at an increased cost per sample). Analysis was delayed due to Covid-related lab closures and delays, but it is anticipated that the material will be analysed during December 2020. The applicant will work closely with the Oxford laboratory to interpret the results, and a publication will then be prepared and submitted (spring-summer 2021).</p>
<p>Please outline the objectives of the Project:</p>	<p>This project aimed to determine management practices directed at various crops in medieval Ireland. The project's objectives were to undertake stable isotope analysis of charred bread wheat and oat grains from an excavated medieval site in Ireland, which enabled testing of the hypothesis that wheat was grown in better quality soils.</p> <div data-bbox="475 1310 1425 1843" data-label="Image"> </div> <p>A relatively new technique to investigate agricultural management practices is Carbon and Nitrogen (^{13}C and ^{15}N) stable isotope analysis of cereal grains. ^{13}C and ^{15}N stable isotope analysis is often undertaken on human bone in archaeology to provide insights into dietary choices. In recent years, researchers have begun to undertake stable isotope analysis of archaeological plant remains, such as charred cereals, to identify farming practices. A major</p>



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	<p>influence on crop ^{15}N values is manuring, which can reflect intensive farming practices (increased inputs into a fixed area of land). Higher ^{13}C values can reflect less shaded and/or drier growing conditions, providing insights into irrigation and other practices.</p> <p>This project undertook ^{13}C and ^{15}N stable isotope analysis of charred bread wheat and oat grains from well-dated medieval deposits at Swords Castle, Co. Dublin to assess if different management practices were applied to these two cereals. The results are awaited, but it is hoped that they will show that bread wheat was grown in better quality soils when compared with oat.</p>
<p>Please describe the methodology used in conducting the research:</p>	<p>(1) Collate charred cereal grains. Permission to analyse the material was secured by the excavation director, Christine Baker, Heritage Officer, Fingal County Council. Analysis also required the granting of licences to alter and export from the National Museum of Ireland because the material was analysed outside Ireland and destroyed during analysis. A total of 35 samples are being analysed (to provide a statistically significant sample); each sample comprised a single grain (recommended revised protocol by the laboratory in Oxford).</p> <p>(2) Record material (digital imaging). Imaging of all grains for analysis was undertaken at UCD Archaeobotany Laboratory.</p>  <p>(3) Undertake ^{13}C and ^{15}N stable isotope analysis at the University of Oxford Radiocarbon Accelerator Unit. Stable isotope analysis will be undertaken at the University of Oxford Radiocarbon Accelerator Unit in December 2020. This is the leading centre globally for stable isotope analysis of archaeobotanical material and, importantly, the leading centre for results interpretation. The applicant had planned to travel to Oxford to prepare the samples there. This involves cleaning</p>



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	<p>of individual grains (potentially involving pre-treatment, based on Fourier transform infrared spectroscopy results), crushing of grains and weighing minute quantities of samples for analysis. Standard samples (e.g. alanine) are also weighed and prepared to calculate raw isotope ratios. The applicant then planned to work with the team at Oxford to complete the stable isotope analysis, using a mass spectrometer. Unfortunately, due to Covid-related travel restrictions and lab closures, this was not possible. At Oxford, the applicant was due to work closely with Assoc. Prof. Amy Styring, Associate Professor of Archaeological Science, School of Archaeology, who is a leading scholar internationally in stable isotope analyses of plant remains. Assoc. Prof. Styring kindly agreed to accept the material and undertake the analysis on behalf of the applicant (at an increased cost). Savings in travel costs were diverted to sample analysis (increased number of samples and associated costs of Oxford undertaking all stages of preparation and analysis).</p> <p>(4) Interpret the results, based upon established research methods, to see if new evidence can be determined for medieval farming practices. The applicant will work closely will Assoc. Prof. Any Styring in writing up the results.</p> <p>(5) Submit publication to international peer-review journal.</p>
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<p>Please outline the findings of your research and/or milestones achieved:</p>	<p>The key milestones completed are collation of material for analysis, photographing the material (individual records shots of each grain due to be analysed), successful application for NMI licences to export and alter the remains, and a revised workplan with Assoc. Prof. Amy Styring at Oxford to ensure full completion of analysis.</p> <p>Further research findings are expected when stable isotope analysis of the samples is completed.</p>
<p>Please provide details of the dissemination of the outcomes from this project:</p>	<p>Analysis is ongoing, which means that dissemination of outcomes has not been achieved yet. See below for future plans.</p>
<p>How will you continue to communicate the results of your project and what are your publication plans?</p>	<p>Dissemination will be achieved through publication of the project results in a high-impact scientific journal. On publication, the applicant will work with Fingal County Council to highlight the results through their web platforms and social media channels. The applicant would also welcome the opportunity to present the results at a future RIA-organised event.</p>
<p>How did the award enhance your</p>	<p>Cancellation of plans to travel to Ireland meant that the applicant had to liaise closely with laboratory in Oxford to ensure suitable material would be chosen for analysis. This collaborative approach has resulted in the applicant learning significantly more about the</p>



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<p>professional development?</p>	<p>tasks and techniques in stable isotope analysis, including how to select suitable material. Assoc. Prof. Any Styring at Oxford has also agreed to co-author the research paper that will detail the results. She is a leading scholar internationally in stable isotope analyses of plant remains, so this is an exciting opportunity for the applicant to work with someone of this calibre.</p>
<p>What plans (if any) do you have to further this project?</p>	<p>The applicant is currently writing a grant application to the Irish Research Council (under their Coalesce scheme) for a major interdisciplinary, intersectoral project. The applicant is seeking almost a quarter of a million euro in funding. The RIA project provides an excellent pilot study to highlight how stable isotope analysis of plant remains in Ireland can provide new insights, and it is intended to undertake more extensive stable isotope analyses in the IRC project.</p>