

The Archaeology of  
**Dun Deardail**

An Iron Age hillfort  
in Glen Nevis

## Acknowledgements

The project was part of the ambitious Nevis Landscape Partnership and was funded by Forestry Commission Scotland and the Heritage Lottery Fund, in partnership with AOC Archaeology. The Site Director was Martin Cook (AOC Archaeology), with the radiocarbon dating strategy overseen by Tony Krus (SUERC Radiocarbon Dating Laboratory, University of Glasgow), vitrification analysis by Amanda Dolan (University of Stirling) and photogrammetric survey by David Connolly (Skyscape Survey). The original project design was developed by Clare Ellis (Argyll Archaeology) with input from Murray Cook (Rampart Scotland) and Matt Ritchie (Forestry Commission Scotland).

This booklet was compiled and edited by Matt Ritchie (Forestry Commission Scotland) and designed by Mungo Orr (MacDonald Orr Design). The Dun Deardail Creature was drawn by Alex Mackinnon (Strontian Primary School). The Dun Deardail vitrification experiment was led by Roddy Mainland. With thanks to Jim Brook, Peter Devlin, Strat Halliday, John Kenny, Freja MacDougall, Dave MacLeod, Ruari Watt, Clare Wilson and all at the Scottish Crannog Centre and Firecracker Recordings.

'The Ballachulish Goddess' is an extract from *'People of Early Scotland'* (courtesy of The Pinkfoot Press, 2006).

Special thanks to the dedicated teams of Forestry Commission Scotland and Nevis Landscape Partnership Rangers – and to our enthusiastic team of volunteer archaeologists – without whom this project would have been impossible.

Published by – Forestry Commission Scotland – February 2018  
© Crown Copyright 2018  
ISBN – 978 0 85538 970 3

FCMS139/FC-S(DIS)/JTCP/1K/FEB18

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Typeset in Garamond, Museo Sans and Rufina Stencil

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# The Archaeology of Dun Deardail

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in Glen Nevis

*Is ann mu seach a thogar an dun  
It is by degrees the fort is built*

# The Story of a Clast

What can one sample of vitrified rock – known as a clast – tell us of its creation? Formed in the great fire of Dun Deardail, our clast formed as minerals melted, glueing together bits of rock. What stories are hidden in it? What can it tell us about the vitrification event of Dun Deardail? We can look at this clast using differing scales of analysis from the hand-held samples examined with the naked eye, down to the microscopic analysis of single elements. Combined, the information contained at each scale can help write the story of the construction and destruction of the hillfort.

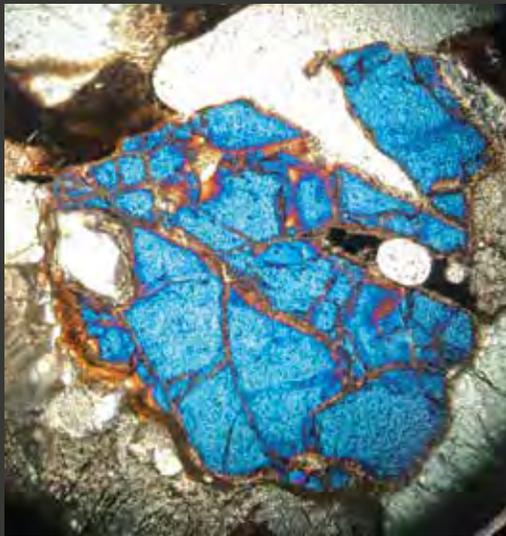
Looking at the outside of the clast, we can see that the rock is covered in small holes known as vesicles. These show that the water in the minerals of the rock was boiling off during vitrification. Imprints of charcoal are also visible in the clast. This is evidence of the timber framework that was part of the structure of the hillfort. At this point, it is difficult to see exactly what rocks have been fused together, so we cut the rock open. In the freshly cut surface of the clast we can now see the different rock types that have been fused together by the intense heat. Using a hand lens helps us to determine what these rock types are. From this we can see that the main rocks used have been the local calc-silicates, pelitic rocks and quartz rocks. Several pieces of granite were also observed.

A thin slice of the clast is then bonded to a glass slide and ground down to a thickness of 30µm, around the width of a human hair. At this thickness, light can pass through the rock and this allows us to look at the mineralogy of the rock under the microscope. We can compare the rocks making up the hillfort ramparts to the rocks in the surrounding area to see if they are the same. This allows us to see if the rocks that the ramparts were built with were local or were imported from elsewhere. As with the visual analysis, the petrology confirms that the rock used to build the ramparts and fill the rubble core were local rocks. Certain minerals only form at set temperatures. These are known as index minerals. Using this index, once we know the mineralogy of the rocks in the clast we can determine a temperature range at which these formed. The temperature of the melt in the hillfort will vary over and around the hillfort due to varying conditions. The presence of mullite in some of the clasts informs us that the temperature of that part must have been greater than 800°C. In other parts of the melt the temperature must have been lower and this is shown by the presence of biotite and orthoclase feldspar. These areas would have only reached between 700°C and 800°C.

The next scale uses x-ray fluorescence to investigate the geochemistry of geological samples. Samples are irradiated with x-rays and when these interact with the minerals in the cut rock sample a packet of energy is emitted. Every chemical element produces a different energy signature and this provides us with another means of identifying the minerals that are present in our clast and to better understand how they have altered during vitrification.







**Above:** This light blue crystal is a fractured olivine crystal observed under crossed polarised light under a petrology microscope. The crystal measures about 500  $\mu\text{m}$  in diameter. The olivine crystal fractured due to the melting of the rock.

When we compared the results from our vitrified clast from the ramparts of the hillfort to samples of the local rocks surrounding the hillfort, we found that the results are very similar. It seems that the rocks in this clast were most likely local rocks, chosen for their ready availability, rather than rocks that had been imported from elsewhere.

Scanning electron microscopy allows us to investigate the clast on an even finer scale, allowing us to investigate single crystals and to build up a picture of chemical changes within the molten rock fragments that are within our clast. Using the chemical composition of certain minerals in the clast, such as orthoclase feldspar and silliminite, we can estimate the temperature of the rock as it melted. Our clast from Dun Deardail appears to have the upper range of between  $850^{\circ}\text{C}$  and  $1100^{\circ}\text{C}$  for the melt. There must have been a sustained, intense fire to allow the rock to melt like this.

Finally, we use Mössbauer spectroscopy to look at just one element: iron. The form in which iron is found in the clast can tell us of the maximum temperature that the rock reached when it melted. It also indicates whether oxygen was in abundance or was absent at the point when the rocks were melted. If there was a lack of oxygen, then we can conclude that something was covering the melt to prevent oxygen getting into the system, or that the fire had used up all of the available oxygen in the combustion process. This may have been an intentional covering to increase the temperature of the fire; or an unintentional covering, such as the melt smothering itself. At Dun Deardail the results from our clast show that the rocks melted and solidified in an oxygen-poor environment. Something was preventing oxygen getting to the melted rocks.

If we take many such clasts from all of the different areas that have been excavated across the hillfort, and repeat the same analyses, we can produce a story of its construction and destruction. From our work to date it appears that local rock was used to build the rampart core at Dun Deardail. It does not look like the rocks were specifically chosen for their melting qualities. This points to the burning event and vitrification being an event that occurred at the end of the hillfort's life, rather than it being a deliberate constructional technique. It also looks like temperatures in the rampart core reached between  $850^{\circ}\text{C}$  and  $1100^{\circ}\text{C}$  as it was burnt, causing minerals to melt and the rocks to vitrify in an oxygen-poor environment. However, different parts of the structure may have had different peak temperatures. Once all our samples have been analysed we will be able to build a better picture of conditions during burning around the ramparts.



Dun Deardail – Derdriu’s fort – sits high above Glen Nevis, overshadowed by Ben Nevis looming opposite. It was built in the middle of the first millennium BC, around 2500 years ago, and was eventually destroyed in a catastrophic fire. Recent archaeological excavation has shed light on the construction, occupation and destruction of the hillfort.