PALAEOCHANNELS:

what they can tell us about past environments, climate change and human interactions

Warren Bailie MCIfA (4719), Operations Director, GUARD Archaeology Ltd

On occasion, palaeochannels are revealed during archaeological investigations, and that can offer opportunities for a better understanding of past environments, assisting us in understanding how human activity interacted with environmental change over time. These palaeochannels were normally formed from sections of oxbow lakes, ponds or old stream courses that slowly filled in as water courses evolved and drifted across the landscape since the end of the last glaciation. Some of these features contain evidence for human occupation along their banks from as early as the Late Mesolithic, but others do not. Palaeochannels with and without directly associated human occupation have been excavated by GUARD Archaeology Ltd over recent years, and the two examples here were sampled for environmental analysis.

Our aims were to find out about the history of the palaeochannels. For example, how long did they remain open; what could the environmental analyses tell us about how the channel evolved and how this reflected change in the surrounding landscape over time; and what evidence is there for human interaction with the channel during periods of settlement activity along its banks?

The range of specialisms we have used to try to answer these questions included the analysis of archaeobotanical remains, pollen, coleoptera, micromorphology and particle size. Combining these with the sampling of sediments for radiocarbon dating and artefact analysis provides a more in-depth study and a chronological framework within which we can understand changes in the environment and how this may have affected human activity. Not all palaeochannels will be suitable for all these analyses, but their application has given surprising results. It is important to note that palaeochannels offer an allochthonous resource for sampling, meaning they act as a reservoir not just for material washing in or being deposited locally, but for wind-blown pollen and other ecofactual material flowing downstream from a potentially much wider area than the immediate locale where human activity is found.

Location of the palaeochannel. Credit: GUARD Archaeology Ltd

Location of Kubiena tin samples in the palaeochannel. Credit: GUARD Archaeology Ltd

Palaeochannel coursing through dry sandy silts (left) and wet silty clay (right). Credit: GUARD Archaeology Ltd

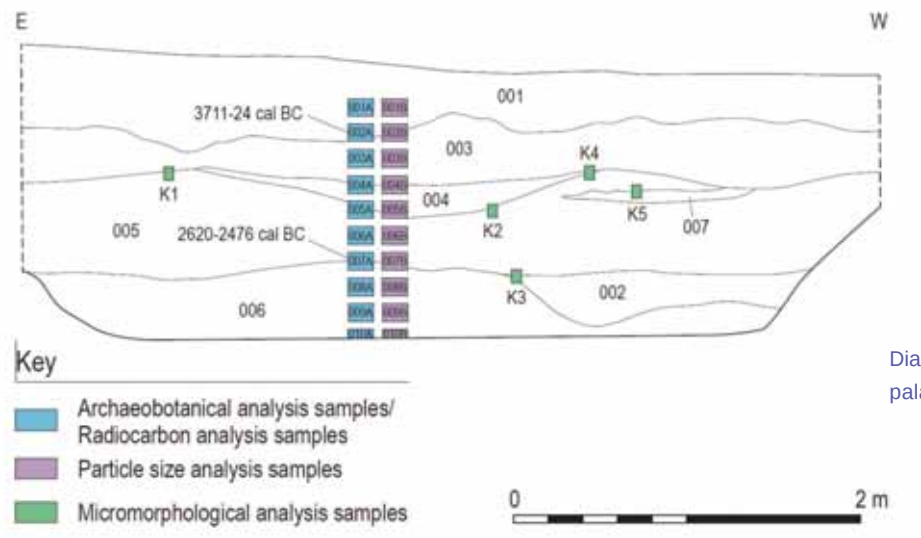

Diagram of sample positions and dated samples from the palaeochannel. Credit: GUARD Archaeology Ltd

Our first example is a development site at Cammo, situated on the outskirts of Edinburgh, close to Edinburgh Airport, the River Almond and the Bughtlin Burn. A desk-based assessment highlighted that part of the area was liable to periodic flooding, as the site was located on a former floodplain. The evaluation located a palaeochannel but unfortunately there was no evidence of nearby prehistoric features. The alluvium deposits of the palaeochannel were almost 2m in depth and two sets of soil samples were taken through their deepest parts, with Kubiena tin samples taken at sediment interfaces.

The results of the archaeobotanical analysis and radiocarbon dating showed there was very little organic material in the sediments to provide evidence of vegetation growing within or around the palaeochannel. However, evidence of some charcoal in the samples indicated that there was anthropogenic activity close to the site, or at least upstream, during prehistory. Particle size analysis demonstrated that the flow velocity within the palaeochannel indicated still or very slow-moving water, which showed that it was not an old river channel but more likely a small tributary, or part of an abraded stream system, or it was only seasonal.

The palaeochannel's deposits were dated to the Early Neolithic and also the Late Neolithic/Early Bronze Age and indicated precipitation and water-level changes during these periods that affected the natural palaeoenvironment and therefore prehistoric settlement in that locale. The radiocarbon dates also indicated that earlier material had eroded away, possibly from upstream banks, and was redeposited over later-dated deposits in the channel.

In this example, indirect evidence for human activity was an important addition to this area of Edinburgh, where the total absence of direct evidence of contemporary settlement was most noticeable.

The second example is that of Ferniegair, near Hamilton, south-east of Glasgow and close to the river Clyde, where a 135m-long palaeochannel was excavated as it ran through the junction of two distinct geologies of sandy silts and clayey silts. The drier sandy deposits documented numerous visits to the area from the Late Mesolithic through to the middle of the Bronze Age, through the survival of archaeological features that provided radiocarbon dates. In contrast to Cammo, the banks of this palaeochannel offered a useful campsite for people travelling along the river valleys. Archaeobotanical and pollen analysis of the sediments within the channel revealed that alder trees grew on its banks and alder wood was predominantly used for firewood.

Coleopteran analysis showed that open water and aquatic vegetation may have existed within the palaeochannel at some stage, perhaps when water flow was favourable. However, micromorphological analysis and radiocarbon dating of its sediments demonstrated that there were fluctuations in the rate of water discharge from the channel, with an initial phase of increased aggradation (deposition of sediment) in the Early Neolithic followed by a phase of relatively slow discharge, with a final phase of increased aggradation in the Early Bronze Age. These fluctuations are likely due, in part, to climatic changes as there is some evidence for accelerated river activity in the British Isles during the Late Mesolithic and early Neolithic, and again during the Early Bronze Age, which was a substantially wetter period in Scotland.

The picture of this palaeochannel has been enriched by analysis and dating of a large quantity of pottery sherds and lithic artefacts, and also organic material that accumulated within it from the Early Neolithic to the Middle Bronze Age. During periods of deposition the palaeochannel is considered to have had a low water flow, but as the channel was infilling with human, animal and fuel waste and discarded artefacts, the sediments were not permanently under water. As the palaeochannel silted the increased biological activity indicated drier conditions and the absence of permanent waterlogging.

Extract from the pollen diagram from the palaeochannel. Credit: GUARD Archaeology Ltd

Palaeochannel Feature 109	**Depth**	**3-4cm**	**8-9cm**	**13-14cm**	**18-19cm**	**23-24cm**
	Context	**132**	**131**	**131**	**130**	**130**
Pollen Taxon						
Trees & shrubs (TLP)	Common name					
Alnus	alder	67.7	58.2	68.1	68.0	74.9
Betula	birch	0.8	-	0.6	-	0.2
Coryloid	hazel type	14.7	24.2	17.3	12.8	9.1
Quercus	oak	0.4	0.8	0.4	0.8	0.2
Salix	willow	0.2	-	-	0.2	0.2
Ulmus	elm	0.2	-	0.4	-	-
Heaths (sum = TLP)						
Calluna vulgaris	heather	0.8	2.0	0.6	0.2	1.0

Our understanding of palaeochannels and any associated anthropogenic activities is dependent not just on radiocarbon dating and material cultural analysis, but on the depth of understanding that the environmental sciences provide, putting past climate changes and human activity in Scotland into perspective.

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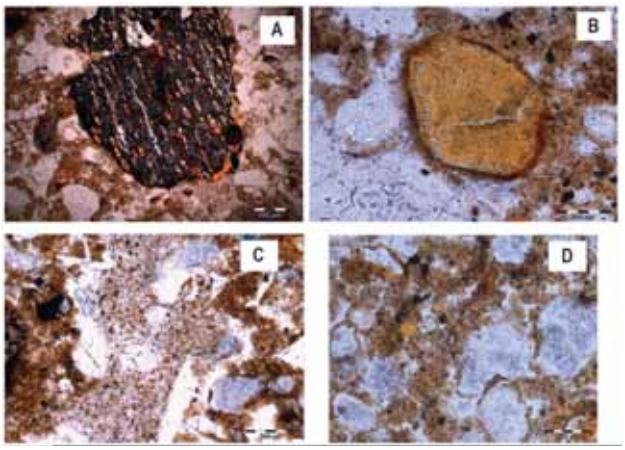

Slides from the micromorphology analysis: a) charcoal fragment, b) phosphatic pedofeature, c) Excremental features, and d) silt coating of quartz grains. Credit: GUARD Archaeology Ltd

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Warren Bailie

Warren is currently Operations Director for GUARD Archaeology Ltd, and has worked in the commercial archaeology sector for almost 20 years. He has experience in directing and managing archaeological fieldwork and post-excavation works across a number of major, mainly prehistoric, sites across Ireland and Scotland, including works on two of Scotland's World Heritage Sites, the Antonine Wall and St Kilda. He has led community archaeology projects and managed training placement opportunities for high school and university students on commercial and community-based projects. Warren was Secretary for the CIfA Scottish Group Committee and is a former Trustee on the Board for Archaeology Scotland.