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Unreviewed Mixed Matters Article:

Broken Rocks, Fired Clay and Soured Milk – A Summer of Experiments with the Bamburgh Research Project at the Bradford Kaims Site

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The Bamburgh Research Project operates an archaeological field school every summer in Northumberland, England. We have two sites: one located at seaside Bamburgh Castle and the other a few miles away inland at the Bradford Kaims. The Bradford Kaims is located on the edge of a wetland and has shown evidence for prehistoric seasonal human occupation. Features and artefacts found on site include burnt mounds, post holes, worked wood, and lithics/debitage (Gardner et al 2015). Over the summer of 2016, we conducted an Experimental Archaeology Programme at the Bradford Kaims in an attempt to better understand the processes involved behind the features and artefacts found at the site. We focussed on processes we could acquire materials for, which included flint knapping, prehistoric pottery, and prehistoric glue.

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Knapping

The first experimental archaeology process attempted was knapping. Knapping is the process of lithic core reduction with the intention of producing a tool. Flint, obsidian, and quartz can all be used as cores to knap tools. First, the core is struck by a denser tool, known as a hard hammer. The impact creates a force which ripples through the stone, known as conchoidal fracturing. The location of the strike on the core is crucial to whether or not a flake is created. If struck on the edge of the platform, a flake will usually break off. Sometimes the pressure will continue through the stone, hit a naturally occurring impurity within the stone and break away which creates a blunt edge (Andrefsky 2005: 11-30).

Students, staff, and local volunteers learned the basics of knapping and attempted to create usable pieces of worked stone. We had two types of stone materials to use: flint and obsidian. Due to its harder nature, we began our experiments using flint and we learned how to properly hold the stone and how to strike. After everyone got the feel for the tools and how the process worked, we began using the obsidian which was easier to flake off, but very sharp. A benefit to using obsidian is that the ripples created from striking were easier to see, facilitating a better understanding for the mechanics behind knapping. We saved the usable flakes to test out later in the season during out woodworking project and we tried using the scrapers and awls on some leather hide, with some success!

Next, we tried pressure flaking which proved to require more finesse. This involves abrading the surface (crushing/sanding down the inconsistent edges to create a stable edge for sharpening) and then applying pressure directly onto the flake edge with a softhammer, pulling down with an antler tine to flake off tiny pieces. This process, though difficult, is necessary as it strengthens and sharpens the flake edge creating a blade. This technique was more difficult to grasp, but everyone was still able to attempt it and gain an appreciation for the skills required to manufacture stone tools. At the end of the day, we saved the flakes which we thought could be hafted and students were able to take a souvenir piece home with them.

Prehistoric Pottery

Our next experimental archaeology project was an effort to make a variety of pottery vessels using only raw clay sourced from our prehistoric site here at the Bradford Kaims Wetland Project. "Prior to the Roman invasion, almost all native pottery in Britain was hand-made and open fired" either on the ground surface or in a pit (Gibson 1997:26). Prehistoric ceramics "were made primarily for domestic use, as storage, cooking or serving containers, or to receive or accompany the bones or bodies of the recent dead" (Woodward 2008: 85-86). Since wheel-throwing and kiln firing produce finer ceramics, prehistoric pottery was comparatively rough and weak compared to the later Roman varieties, but it evidently served its various purposes well enough. Archaeological evidence suggests that the early production of pottery was non-specialised, and that it was being produced "as and when needed, regardless of the time of year" (Gibson 1997:48).

We knew from previous seasons that the trenches and test pits often turn up natural clay deposits of varying colours and quality. Excavations here at the Kaims have also produced a few examples of possible Late Bronze Age or Early Iron Age potsherds. So, given the pottery record on site and the abundance of raw material, this summer's experimental archaeology program seemed like a perfect opportunity to test out our prehistoric potting skills! Altogether the process of preparing the clay, forming the pots, and the subsequent firing turned out to be a messy, fun and educational experiment for all involved.

Step 1: gathering the clay
While digging a series of shovel test pits early in the season, we hit upon a substantial deposit of clay about 50cm below topsoil. Seeing a source of raw material for our pottery experiment, I took the opportunity to fill a bucket. Though the clay was mostly light orangey-brown, there was a thin layer of grey overlaying that; it also gathered silt and peat on its way out of our 20 cm by 20 cm shovel test pit. Through processing, these colours and textures blended together as shown in the photos.

Step 2: processing the clay
This was the longest part of the process due in part to my own inexperience and also to the wet conditions on site. I knew from research that a popular way of processing raw clay is to dry it out completely, grind it to a powder, sieve the powder, and slowly reintroduce water until the clay reaches a workable consistency. I also knew how unlikely it would be that we could completely dry out such a large quantity of clay in a timely manner due to the conditions on site and daily rain. So, I opted instead for wet processing, which involved the help of several pairs of hands pulling all the clay into small lumps and mashing/mixing it up

with added water in a large plastic box. This part worked better than expected and after a couple of days of minimal stirring we had a large quantity of clay slip (liquid clay).

At this point we poured the slip through a sieve to remove the largest inclusions, mostly small stones and twigs. We could have used smaller screens and sieved multiple times for greater purity, but I chose not to since evidence indicates that prehistoric potting clay was not processed to a high degree.

For about a week I attempted to do a daily pouring-off of the water that would accumulate on the surface, hoping that between evaporation and pouring off the clay would thicken a bit every day. The few days I was able to let the boxes sit out in the sun did help, but it wasn't working quickly enough: I had seriously underestimated the time this technique would take, and began considering methods less than historically accurate.

On one sunny day, I cut open a bin liner and laid it out on the grass like a small tarpaulin, then I poured the thickened slip out onto the plastic. This increased the surface area the sun could reach and it was noticeably thicker by the end of the work day, but it still wasn't drying out fast enough. We had to rearrange the experimental schedule and move pottery back a week. I had only a week to get some workable clay and I was running out of ideas!

My final effort involved pouring the clay into an old pillowcase, tying it closed with string and hanging it from a tree to allow the water to drain out with gravity and air. The better part of the week passed before I noticed much of a change, but much to my relief, the night before we were scheduled to make the pots we had somewhat sticky but relatively workable clay!

Step 3: forming the pots

Though "not all clays used for the manufacture of pottery in antiquity needed to be modified by potters by the addition of opening materials" (Gibson 1997) we decided to experiment with a temper; this was created by the students using rocks to crush up a few soft pieces of sandstone sourced from Trench 6. Since wheels were not used by prehistoric potters, the students learned to use the two most common methods of building pottery without a wheel: the pinch method (formed by pinching a solid ball of clay into the desired shape) and the coiling method (rolling out rings of clay, stacking the rings, and smoothing them together). A bit of temper was added by each student to their own allotment of clay. Of course, we had some creative minds in the mix who ventured beyond the utilitarian forms like bowls and jars, and by the end of the day we had quite a collection of unique creations! We set everything we made on two easily transportable wooden disks, then we allowed the pieces to dry for a week, as the absence of water in the clay is necessary for successful firing.

Step 4: firing

When it was time for firing, we began by building a small fire in a 1 m by 1 m pit. At first we placed the dried pots around the edge of the pit and then moved them in stages close to the fire; this allowed them to heat up more slowly and decreased the chance of cracking. Once the pieces were against the central fire, we began placing larger branches and pieces of wood over and around the pots, completely covering them. We kept a large fire burning for about one and a half hours then allowed it to die down to embers.

The final step of firing is allowing the pots to completely cool before removing them from the pit. Before we left site for the day, we dug the pots—none of which had broken!—out of the coals, stacking them against one wall of the fire pit and shovelling the coals to the opposite wall. We then covered the pots with a layer of grasses and sedge, placed a couple of metal sheets over the pit to protect the pots from rain, then left for the night.

Upon examining the cooled pottery the next day I was pleased to confirm that none of the vessels had cracked or exploded during firing. Additionally, the pieces had fired, if not completely through, then most of the way through despite the shortened firing time. The fired pots are noticeably brittle and not completely water tight, but with a little more practice we could probably produce vessels that would be more serviceable. Since we accomplished our goal of using only raw materials from site and an open fire to create prehistory-inspired pottery—and we had fun doing it—we called this experiment a success!

Prehistoric Glue

Once we knew that woodworking and flint knapping were in our schedule, we thought we should see if we could combine the two products from these activities to make a tool. In order to do this, we decided to try making glue with resources that would have been available to the prehistoric people at the Bradford Kaims. An article by Lyn Wadley (2005) focusses on residue studies from lithics found in South Africa, and suggests that ochre was part of the adhesive and not simply decoration on the surface of the tool; when we saw red ochre coming out of the ground in Trench 6, we decided to include it in our recipe in order to take advantage of as many natural resources as possible.

The recipe for the adhesive was based loosely on one that was found online, with changes to ingredients that would not have been present in prehistoric Bradford Kaims. While milk was curdled by vinegar in the original recipe, we let ours go off and separate naturally before draining away the liquid and leaving the white solids. We then slowly heated the milk solids in a pan over hot stones with a small amount of water, before adding ash to the mix; the recipe called for baking powder, but ash from the fire was its natural replacement because of its alkaline properties. At this point we also put in the red ochre that we had been collecting throughout the season. All of this was mixed using a stick, and we waited for it to become sticky.

Although the experiment was ultimately a failure as the adhesive did not become sticky, it did make us think about alternative ways one might attach a blade to a wooden handle. For example, the Kaims has an enormous supply of sedge which could have been used to make string to tie the two components together. As for our glue, we will have to revise our recipe and try it again in the future.

In the end, some of our attempts worked better than others. We may not have completely recreated a tool from start to finish, but the students, volunteers and staff alike all enjoyed learning about the processes and mechanics involved in recreating prehistoric tools and implements.

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event

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Gallery Image

FIG 1. RAW CLAY

FIG 2. CRUSHING SANDSTONE FOR TEMPER

FIG 3. COARSE SAND FOR TEMPER

FIG 4. INCREASING SURFACE AREA FOR EVAPORATION

FIG 5. ATTEMPTING TO THICKEN

FIG 6. SIEVING THE SLIP

FIG 7. SLAKING THE CLAY

FIG 8. SLOWLY THICKENING SLIP

FIG 9. THICKENED CLAY

FIG 10. STAFF FORMING THE CLAY

FIG 11. STUDENTS FORMING THE CLAY

FIG 12. POTTERY PRE-FIRING

FIG 13. FIRED CERAMICS

FIG 14. FINAL PRODUCT 1

FIG 15. FINAL PRODUCT 2

FIG 16. TEACHING PROPER STRIKE TECHNIQUE

FIG 17. EXAMPLES OF OBSIDIAN AND FLINT

FIG 18. OBSIDIAN PIECE_POTENTIAL SCRAPER

FIG 19. EXAMPLE OF RIPPLES IN OBSIDIAN

FIG 20. RETOUCHED FLAKE EDGE