Continuity and interaction in the Iron Age of central Anatolia

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Background

The excavations at Çadır Höyük in central Anatolia evolved out of the original University of Chicago Oriental Institute excavations at nearby Alişar Höyük, which were undertaken by Hans Henning von der Osten from 1926–1932. In 1993, a project was initiated under the directorship of Ronald L. Gorny to re-map the mound and conduct a survey of the surrounding region. The survey brought to light the hitherto undocumented site of Çadır Höyük. These two neighbouring sites were occupied at the same time during the Bronze Age and the Iron Age.

The site at Çadır is a contender for the ancient city of Zippalanda, while Alişar is recognised as Ankuwa. Hittite archives document journeys taken by the king within this region, between these cities and also to the sacred mountain which became the Iron Age site of Kerkenes Dağ and to the capital at Boğazköy/Hattusa. These sites appear to have had interlinking social, economic and religious functions, and to have had significant interaction with one another, and were part of a wider network of settlements, each of which may have had its own particular inter-city relationships within the network. Understanding these relationships, or lack thereof, during the Iron Age is important for our overall understanding of post-Hittite central Anatolia.

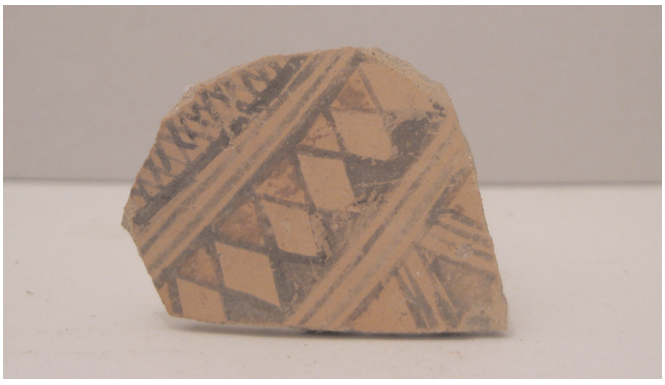
Both Çadır Höyük and Alişar Höyük have yielded large assemblages of painted pottery of Iron Age date, containing thousands of sherds. The Çadır Höyük and Alişar Höyük Middle Iron Age ceramics are stylistically very similar. Decorative motifs are largely held in common, with 'wavy line style' ceramics and examples of pottery with a style of animal motif decoration commonly known as 'Alişar IV ware'; the latter is more plentiful among the Oriental Institute's collection, but there are a few examples from Çadır Höyük. Decoration was painted, probably with an organic brush, either directly onto the unfired ceramic body or onto a surface coated with a liquid clay slip of lighter colour than the fabric. Colours are most commonly dark-brown or black and red or red-brown.

A wide selection of ceramic material – from all levels of the sites – was used for this study, based on accessibility, permission of museum departments and the suitability of the sherds themselves. In this respect, thanks must be offered to the excavation directors of Çadır Höyük, for their permission to use the site material, and to the Oriental Institute, for facilitating access to its collection of pottery from von der Osten's excavations at Alişar Höyük. Additional thanks go to the Lambarde Fund (Society of Antiquaries of London) for the research travel grant which was awarded to me to enable travel to Chicago.

Research questions and methodology

The primary purpose of my study is to attempt to 'map' the distribution of ceramic fabric types (that is, the clay from which the pottery was made) between, initially, these two neighbouring sites. Various questions may be answered by such an attempt. For example, does a chemically compared ceramic dataset of Iron Age pottery from the sites allow chemically distinct groups of pottery to be distinguished? If so, are the same groups present at both sites and might this indicate that the two cities were trading ceramics? Also, for the material from Çadır Höyük the internal distribution of fabric groups is of particular interest, the key question being whether or not use of any specific clay sources remained consistent over the course of the occupation of the site. Changes in the fabric types used for the pottery made and/or used across a city's lifespan can illuminate a number of social and economic aspects, regarding the modes of production and distribution, access to raw materials and supply and demand. This year's work necessarily focused on this last question first, as the outcome establishes the foundation for any future comparisons between sites. Lastly, I am interested to determine if there were 'recipes' for the various shades of colour used to decorate the pots, by testing the chemical makeup of the pigments used as paints on the pottery. Thus, where possible (in other words, in cases of well-preserved painted sherds), the paints were analysed to determine the mineral pigments used.

The analytical method I used to obtain data on the ceramic fabrics and pigments is called Portable X-Ray Fluorescence analysis (PXRF). Outside industrial contexts, this analytical method is now used by museums, art galleries and archaeologists to obtain detailed chemical fingerprints of materials being analysed, in the form of elemental spectrums. I chose this technique because it can be used on fragments down to 5m × 5mm in surface area, it is a fast method of data collection and it also offers the perfect balance between portability and accuracy, allowing me to take the instrument to museums and field labs with ease. Bruker Elemental have generously supported this project by loaning a Bruker Tracer III-SD instrument whenever required.



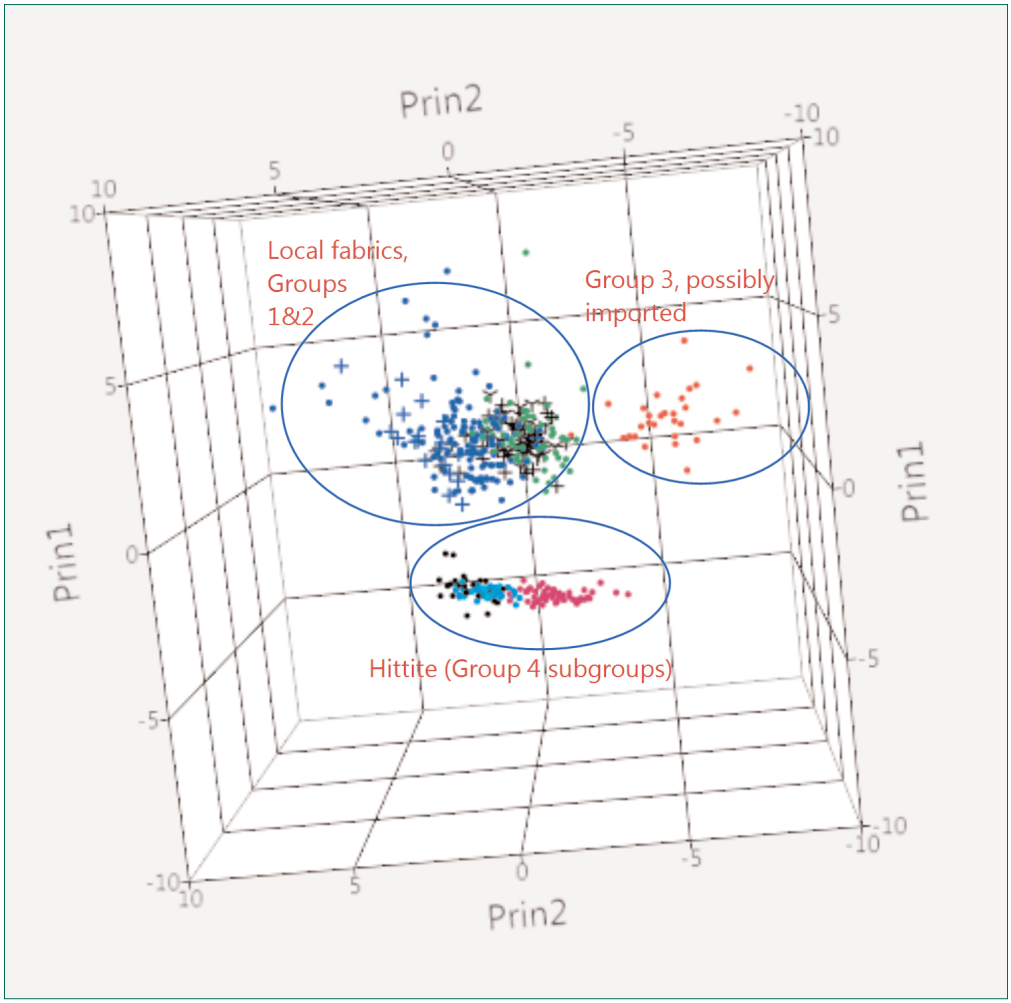
Sherd from Çadır Höyük displaying particularly fine geometric decoration

The results so far: fabric types

This year, all the necessary sample data were collected from the two sites that form the core of this study. It is hoped that permission will be forthcoming to add a further neighbouring site in the near future, in order to continue and expand the study. For the moment, only the Çadır Höyük results have been processed fully and can be reported on briefly here. A three-dimensional scatterplot (below) shows the fabric type groupings from all sampled levels of the site, from the Chalcolithic through to the Middle Iron Age. The Early Iron Age is not well defined at Çadır Höyük as yet, and so pottery from these disturbed layers was not selected for analysis.

The internal distribution of the ceramic types at Çadır Höyük shows an interesting pattern. Four broad fabric types can be determined by elemental content. Group 1 is an iron- and titanium-rich group (represented by blue dots on the scatterplot below); Group 2 is an iron- and titanium-poor group (green dots); Group 3 is a rubidium-rich group (red dots), which is particularly distinct; and Group 4 comprises three closely-related subgroups (Groups 4a, 4b and 4c shown by pink, light-blue and black dots respectively) which appear only in the Hittite-period material.

When the Çadır data are tagged for Chalcolithic, Early Bronze Age, Middle Bronze Age and Hittite pottery, the pattern of fabric-type use is extremely interesting; the plot is very distinctly patterned. Hittite pottery (shown by pink, light-blue and black dots; Groups 4a, 4b and 4c respectively) is completely separate from the other types used throughout all the other occupation levels, and appears to consist of three similar but not identical fabric types. Most interestingly, the Chalcolithic (shown as black 'Y' markers on the scatterplot), Early Bronze Age (black '+' markers) and Middle Bronze Age (blue '+' markers) types correlate exactly with Groups 1 and 2, with the Middle Bronze Age lying almost exactly within Group 1. In essence, this means that it can be safely stated that Groups 1 and 2 are definitely local to the site, as they comprise the totality of the ceramic assemblage across several occupation levels. The subgroups which make up Group 4 are so different that Josh Cannon (Hittite pottery specialist for the site) and I are of the opinion that they are an imported pottery type (or types). This would follow the accepted view expressed regularly about the centralised and controlled distribution patterns for goods. The



Three-dimensional scatterplot of fabric groups, including their chronological patterning

pottery may have been brought to the site from a neighbouring 'hub' city, though that is unlikely to be as distant as Boğazköy/Hattusa. The subgroupings we detect on closer inspection of the Hittite material alone may indicate that it comprises the production of more than one workshop, with the source clay being from the same general vicinity, with post-extraction treatments or processes (such as temper addition) being responsible for some alteration in the makeup. This Group 4 demonstrates a complete break in local clay exploitation during the Hittite period, with no local material appearing in the levels associated with Hittite ceramics.

Curiously, the pattern of clay exploitation reverts generally to use of the same local clay sources after the Hittite collapse, with the exception of Group 3, which may belong to a pottery type imported from a nearby city or may show the emerging use of a new clay deposit with a granitic geological basis. Granite geology does appear in the Alişar region, and this may be a clue to either the sourcing of the clay or indeed the import of finished wares. This issue will become clearer as the results from that site are processed in the coming months, and compared with the data from Çadır.

The results so far: paints and pigments

Three distinct groupings are observed in the plotted data for paint readings from Çadır Höyük. These groupings indicate three broad elemental composition types within the paint. Pigment Type 1, which includes all the red and reddish-brown paint samples, has a substantial amount of iron and very little manganese or other pigmented trace elements. Type 2 features all the brown and dark-brown paint samples, and is shown to be quite high in iron, but still relatively low in manganese with slightly elevated copper, nickle and cobalt values. Type 3 comprises all the darkest-brown and black pigments, and is typically high in both iron and manganese (though the actual ratio of manganese to iron is still very low) and relatively high in copper, nickle and cobalt impurities in comparison with the other two groups. Many of the very dark-brown or black pigments also display elevated levels of calcium in comparison to their respective substrate readings, which may indicate the addition of calcium-rich clay or ground eggshell paste to the pigment as a filler.

The local Yozgat province has widely occurring deposits of iron and ferromanganese ores of varying size and quality, such as the deposits at Eymir and Derbent, Cinhanpaşa Köyü and Büyükmahal Köyü. Many of these are quite distant from Çadır, lying almost a day's journey away (around 17 hours walking time in the case of the Derbent deposit and between 10 and 11 hours for Eymir and Büyükmahal, for example). However, Çadır lies much closer – within a five- or six-hour walk – to two major deposits of minerals which could have been used to produce pigments for the painted pottery. Just three and a half hours away, along the modern road – less by overland hike, 'as the crow flies' – there is a deposit of magnetite and hematite in the environs of Büyükören Köyü. A further two-and-a-half-hour walk leads to the magnetite and hematite sources that have been identified and examined from the environs of three small settlements: Karabacak Köyü, Atkayasi and Uzunkuyu. Hematite (Fe_2O_3) would also have leached into the soils immediately around these deposits and have led to red ochre earths, easily obtainable and easily carried in small quantities.

Also in the vicinity – a five- or six-hour walk from Çadır – is the large deposit of ferromanganese at Sarıkaya. This deposit in particular seems a plausible source for the paints in which manganese is a substantial component. Nodules of manganese-bearing minerals from the Sarıkaya deposit, in which there are types of varying quality, are a plausible source of black or very dark-brown pigment. Given the wide range of shades of brown and black observed on the sherds, it seems likely that the minerals were obtained in small batches, and may have been processed in various ways according to the particular preference of the craftsperson or workshop regarding the tonal shade or viscosity (and thus pigment density) of the paint. Tonal shade can be influenced by the preferred application method, whether by animal-hair brush, softened reed or some other form of organic applicator. Some 'brushes' require less viscous paints for proper application technique, for instance.

Final thoughts

The results from Alişar Höyük are eagerly anticipated. It will be very interesting to see if the mineral signatures are similar and if there was a preference for one or more of the three pigment types noted at Çadır. It will also be fascinating to learn if there is a reflection or correlation with the proposed 'imported Iron Age painted pottery' of fabric Group 3.

A Bruker Tracer III-SD analysis system (image courtesy of Bruker.com)