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Press Release

A story of earth and fire: Ancient pottery workshop reveals Iron Age production chain

Universities of Tübingen and Munich discover a well-preserved workshop in northern Iraq's Dinka Settlement Complex, uncovering valuable new details of ceramic production some 3000 years ago

Tübingen, 23 December 2025

Ceramics are one of the most important sources of information for archaeologists. Yet how these objects are produced, especially in the firing stage, has received little attention to date. The excavation of a well-preserved pottery workshop at one of the most significant archaeological sites in Iraq's Kurdistan region now offers the opportunity for an integrated analysis of an entire local production chain. Researchers from the University of Tübingen and the LMU Munich working at the Dinka Settlement Complex (DSC) have gained new insights into Iron Age ceramics production, from clay to kiln to finished ceramics. Their study has been published in the *Journal of Archaeological Science*.

Work at the Dinka Settlement Complex has been under way since 2015; it is now one of the most extensively excavated Iron Age urban settlements in the region. Within this landscape of ruins, in an area called Gird-i Bazar, the research team discovered the remains of a pottery workshop dating to between 1200 and 800 BCE. Two kilns were excavated there, as well as the debris of pottery making and intact layers of sediment.

Shared tradition and identity expressed through pottery production

"Because the workshop was so well preserved, we were able to combine various techniques and thus obtain a comprehensive picture of how potters actually worked in this region during the Iron Age," says leading author Dr. Silvia Amicone from the Archaeometry Research Group at the University of Tübingen.

The researchers examined the materials, including raw clay, finished pottery, and kiln linings, as well as the kiln fill and the remains of the fuel used during firing. By analyzing the mineralogy and microstructure of the clay and pottery samples and by establishing the presence of specific

minerals, the team identified the raw materials and manufacturing techniques used to produce the pottery.

The analyses show that, although vessels from the settlement were shaped and finished in slightly different ways, likely depending on their intended function, these variations were embedded within a modular and well-organized production system that probably served not only the Dinka Settlement Complex but also the surrounding region, in which the Gird-i Bazar workshop likely played a central role. This interpretation is reinforced by the widespread evidence of pottery production across the settlement complex, including more possible kilns identified using geophysical analysis. This suggests that pottery manufacture was integral to the urban layout and that Gird-i Bazar formed part of a network of workshops operating according to common procedures.

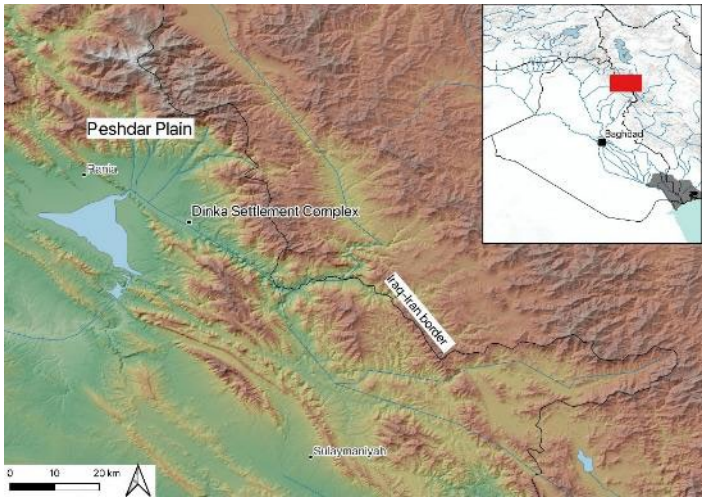
“Potters may have employed different routines during the early stages of manufacture, yet they ultimately relied on the same simple and efficient low-firing methods: temperatures below 900 degrees Celsius, oxidizing conditions, slow heating rates, and short firing times in simple updraught kilns,” Silvia Amicone says. “This uniformity in manufacturing not only suggests a shared tradition and a strong collective production identity but also indicates a degree of coordination that may reflect highly organized workflows and institutional oversight in the management of resources, labor, and technological knowledge, demonstrating a level of complexity that was unexpected for the region at that time,” says Silvia Amicone.

Crafting urban life: specialized production at the heart of Iron Age society

The Dinka Settlement Complex was first investigated between 2015 and 2020 by the Peshdar Plain Project under the direction of Professor Karen Radner (LMU Munich), who has highlighted the significance of the discovery for the archaeology of the Zagros region: “The Dinka Settlement Complex gives us a rare opportunity to explore how an Iron Age center in the Zagros region functioned. The workshop at Gird-i Bazar shows that specialized craft production was not peripheral but embedded in the urban fabric, and this provides new insight into the organization and complexity of life in the Zagros during the first millennium BCE.” Ongoing excavations are now being conducted by the University of Münster under Professor Florian Janoscha Kreppner and will continue to shed light on the complexity of Iron Age life in the Zagros.

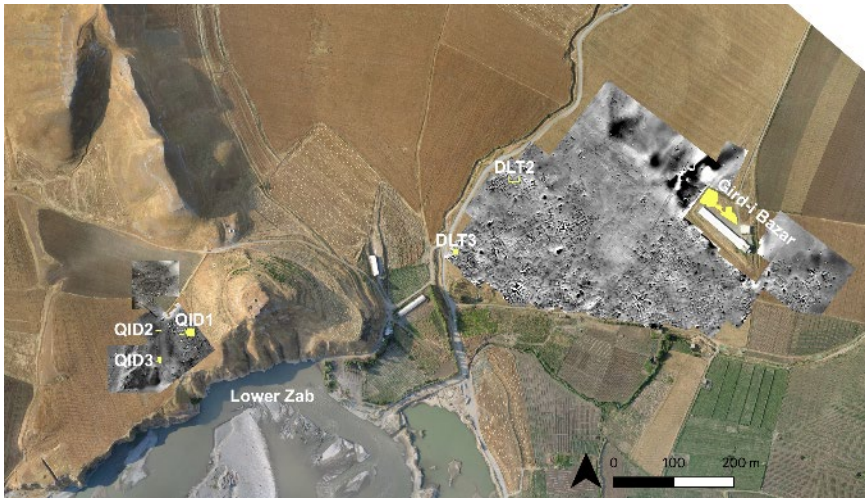
Professor Dr. Dr. h.c. (Dōshisha) Karla Pollmann, President of the University of Tübingen says: “The study of pottery production at the Dinka Settlement Complex offers a unique glimpse into the organization and innovative strength of early urban societies. These findings reveal how technological knowledge and communal structures laid the foundation for cultural development more than 2,500 years ago. Research of this kind reminds us that progress has always been a collective achievement—then as now.”

A panoramic view of the Lower Zab from the Upper Town. Image: Andrea Squitieri

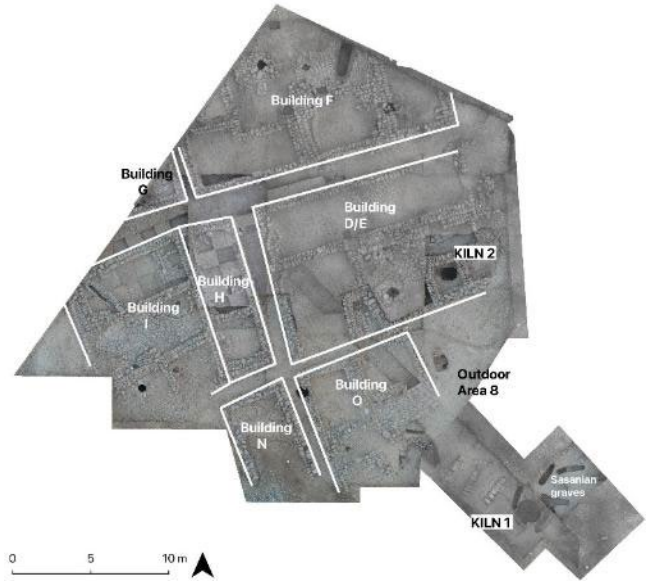


Map showing the Dinka Settlement Complex within the Peshdar Plain. The area is located in the Kurdish Autonomous Region of Iraq, in the district of Qaladze, bordering Iran. Map created by Andrea Squitieri

The Upper and Lower Towns of the Dinka Settlement Complex. In yellow the excavation areas at Gird-i Bazar. Image created by Andrea Squitieri



Aerial view of the Dinka Settlement Complex, illustrating the internal organization of the site as revealed by the geophysical map. Image created by Andrea Squitieri



Aerial view of the buildings and kilns unearthed in the western part of Gird-i Bazar.
Image created by Andrea Squitieri

The unearthed pottery workshop of Gird-i Bazar. From this perspective, the walls of the buildings are clearly visible, along with the kilns. Images: Andrea Squitieri

Kiln 1 has a diameter of approximately 2 m. Although the top of the kiln was missing, the lining was still well preserved. The kiln featured a subterranean combustion chamber connected to an upper chamber by a perforated floor; this facilitated heat transfer from below. Fragments of this perforated floor were recovered on site.
Left image: Andrea Squitieri. Right image: Silvia Amicone

Kiln 2 measures approximately 1 m in diameter. Like Kiln 1, it features a sunken combustion chamber. The thick walls show clear evidence of prolonged exposure to high temperatures. The fill consisted of burnt clay, fragments of fired bricks, ash, charcoal, and a small number of pottery sherds, together with debris resulting from the kiln's collapse.
Images: Andrea Squitieri

Images of selected pottery sherds from Gird-i Bazar. Figures **a–c** and **g–i** are thin-section photomicrographs, while figures **d–f** and **j–l** show macro-fabric photographs of the same sherds. The photomicrographs highlight differences in mineral composition. Created by Baptiste Solard

Publication:

Amicone, S., Dinckal, A., Gur-Arieh, S., Solard, B., Squitieri, A., Frencken, M., Herr, JJ., Miller, C. E., Berthold, C., Radner, K.: Assembling the Puzzle Pieces: Integrating Pottery and Kiln Analysis to Reconstruct Pyrotechnology at the Dinka Settlement Complex (Iraqi Kurdistan). *Journal of Archaeological Science*, https://doi.org/10.1016/j.jas.2025.106425

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