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| A red circle with a white letter  Description automatically generated | Supplementary material for  Maltas, T. & S. Günel. 2024. **Late Bronze Age crops from Çine-Tepecik, western Anatolia: insights into farming and political economy in the lands of Arzawa.** *Antiquity* 98.  Author for correspondence ✉ tom.maltas@keble.ox.ac.uk |

**Çine-Tepecik and its cultural definition**

Çine-Tepecik is located near the Çine Stream (Marsyas) on a fertile plain south of the Büyük Menderes River (Meander). The geographical location of this region plays an important role in the cultural development and nature of interregional relations in western Anatolia. According to the chronological division of Çine-Tepecik, the earliest remains date to the Chalcolithic period (Late Neolithic in the Aegean chronology) and the settlement process is followed to the end of the Late Bronze Age. The historical processes of the Çine Plain and of Çine-Tepecik have been shaped by arable farming and animal husbandry. Buildings with storage facilities, chipped stone blades and arrowheads of obsidian and flint attest to the impacts of agriculture and animal husbandry on social lives and interregional communication at Çine-Tepecik across all phases of occupation (Günel 2014: 91, fig. 8, 2021: 120–21, fig. 3; Günel & Kıyak 2022: 4–5, fig. 3).

The importance of agriculture and trade networks are reflected most clearly in the second millennium BC. The cultural layer of the Late Bronze Age (II 1) shows a settlement plan with a defence system and towers. Archaeological finds attest to cultural and commercial activities connecting Anatolia, the Aegean and the eastern Mediterranean (Günel 2010, 2020; Günel & Kıyak 2022; Kıyak 2022). Storage facilities and workshops reveal a well-developed socio-economic system. Agricultural products were stored in pithoi built into a stone platform constructed next to the likely extension of the fortification system and in a dedicated storage magazine. Radiocarbon dating of material from inside pithoi was carried out at the Miami-Beta Laboratory and TÜBITAK Marmara Research Centre. This gave a date interval of 1415–1125 BC (Günel 2020: 36, 2021: 125).

The dedicated storage magazine was 16.5 × 4.5m in size and contained pithoi, large numbers of pithos fragments and bases, and complete vessels (Günel 2017a: 125, 2021: 124–25, fig. 8). Seal impressions with Anatolian hieroglyphs indicate local administrative power over storage. Impressions with hieroglyphs belonging to the Hittite empire indicate official communication between Çine-Tepecik and the Hittites (Günel & Herbordt 2010: 5–8, fig. 4-6, 2014: 8–11, fig. 8–10). One of the impressions identified the owner of the seal as a Hittite prince ‘Tamipiya’ and the other bore a name similar to ‘[Tark]asnaya]’ or ‘[Tark]asna-piya]’, the thirteenth-century king of Mira (Günel & Herbodt 2010, 2014).

Material culture from Çine-Tepecik attests to cultural and commercial activities linking Anatolia, the Aegean and the eastern Mediterranean. A rich group of finds belonging to the Mycenaean painted pottery tradition shed light on the cultural network of the Aegean and belong to the LH III B2 and LH III C (c. 1350/1300–1240/1100 BC) (Günel 2010: 39–45, 2017a: 125–26, figs 10.4 & 10.5, 2017b: 443–48; Günel & Herbordt 2014: 3-7, fig. 3-7). Combined with the philological results from the seal impressions, the archaeological data from Çine-Tepecik suggest that it was a strong centre dominating natural roads in the south of the Arzawa/Mira lands in the historical geography of western Anatolia (Günel 2017a: 126).

**Archaeobotanical methods**

Sediment was sampled for archaeobotanical remains from visibly burnt contexts and inside pithoi and ceramic vessels (i.e., a ‘judgemental’ sampling strategy – Figueiral & Willcox 1999). In some cases, archaeobotanical remains were ‘hand-picked’ from the sediment during excavation. Soil samples were processed by water flotation using an Ankara type flotation tank (French 1971). Remains that floated (the flot) were collected in a 300μm mesh and the rest (the heavy residue) were retained in a 1mm mesh. Large flots were sieved into >1mm and 300μm–1mm portions to aid in the recovery of smaller remains. The >1mm portions were sorted in their entirety. Large 300μm–1mm portions and heavy residues were subsampled to no less than an eighth of the sample. The counts were then multiplied up to the whole sample. Only the heavy residues of samples containing 20 or more crop seeds were sorted as these samples were selected for more detailed compositional analysis.

Samples were analysed using a low-power stereo microscope (7–45×). Plant taxa were identified by comparison with modern seeds of selected crop taxa from TM’s personal reference collection alongside published sources (e.g., Nesbitt 2017). Lists of species geographically relevant to the sites were extracted from *Flora of Turkey* (Davis 1965–84). Very limited taxonomic identification of arable weed and wild species was carried out due to restricted access to large seed reference collections within Turkey and restrictions on transporting archaeobotanical material.

Plant remains were quantified to establish the ‘minimum number of plant parts’ present using ‘diagnostic zones’ so that single structures were not counted more than once (*cf*. Jones 1991). For cereal crop grains, embryo and apical ends were counted separately and the higher number used. For pulses, the seeds of which often split in two, half seeds were counted as 0.5 and the total rounded up to the nearest whole number. The minimum number of seeds of arable weed/wild and fruit taxa was estimated by visual inspection. The sizes of archaeobotanical remains were measured with reference to measurements of modern seeds from published sources in order to account for distortion during charring (Charles *et al*. 2015).

**References**

Charles, M., E. Forster, M. Wallace & G. Jones. 2015. “Nor ever lightning char thy grain”: establishing archaeologically relevant charring conditions and their effect on glume wheat grain morphology. *Science and Technology of Archaeological Research* 1: 1–6. https://doi.org/10.1179/2054892315Y.0000000008

Davis, P.H. 1965–84. *Flora of Turkey and the East Aegean Islands* volumes 1–8. Edinburgh: Edinburgh University Press.

Figueiral, I. & G. Willcox. 1999. Archaeobotany: collecting and analytical techniques for subfossils, in T.P. Jones & N.P. Rowe (ed.) *Fossil plants and spores: modern techniques*: 290–94. London: Geological Society.

French, D. 1971. An experiment in water-sieving. *Anatolian Studies* 21: 59–64. https://doi.org/10.2307/3642629

Günel, S. 2010. Mycenaean cultural impact on the Çine (Marsyas) plain, southwest Anatolia: the evidence from Çine-Tepecik. *Anatolian Studies* 60: 25–49. https://doi.org/10.1017/S0066154600001009

– 2014. New contributions regarding prehistoric cultures in Meander Region: Çine-Tepecik, in B. Horejs & M. Mehofer (ed.) *Western Anatolia before Troy. Proto-urbanisation in the 4th millennium BC?*: 83–103. Vienna: Austrian Academy of Science.

– 2017a. The west: archaeology, in M. Weeden & L.Z. Ullman (ed.) *Hittite landscape and geography*: 119–33. Leiden: Brill. https://doi.org/10.1163/9789004349391\_014

– 2017b. Çine-Tepecik Yerleşmesine Ait Figürlü Miken Seramiği, in E. Kozel *et al*. (ed.) *Questions, approaches, and dialogues in eastern Mediterranean archaeology, studies in honor of Marie-Henriette and Charles Gates*: 439–55. Münster: Ugarit.

– 2020. Karia Bölgesi’nin Kentleşme Sürecinde Çine-Tepecik Höyüğü/The process of urbanization in Caria in light of Çine-Tepecik mound, in O.C. Henry & A. Belgin-Henry (ed.) *Karialılar Denizcilerden Kent Kuruculara/The Carians from seafarers to city builders*: 28–41. Istanbul: Yapı Kredi.

– 2021. Çine-Tepecik’in Kültürel Gelişiminde Kentleşme Sürecini Anlamak/Understanding the urbanization process in Çine-Tepecik’s cultural development. *Anadolu Araştırmaları Dergisi* 24: 117–44. https://doi.org/10.26650/anar.2021.24.945531

Günel, S. & S. Herbordt. 2010. Ein hethitischer Siegelabdruck aus Çine-Tepecik. *Archäologischer Anzeiger* 2010/1: 1–11.

– 2014. Mykenische Kraterfragmente mit figürlichen Darstellungen und ein Siegelabdruck eines hethitischen Prinzen aus der spätbronzezeitlichen Siedlung von Çine-Tepecik. *Archäologischer Anzeiger* 2014/1: 1–14.

Günel, S. & T.K. Kiyak. 2022. Büyük Menderes’in Erken Dönem Sosyo-Kültürel Gelişiminde Çine-Tepecik Kazıları/Çine-Tepecik excavations in the socio-cultural development of Büyük Menderes in the early period. *Lycus Dergisi* 6: 1–24. https://doi.org/10.54577/lycus.1181220

Jones, G. 1991. Numerical analysis in archaeobotany, in W. Van Zeist, K. Wasylikowa & K. Behre (ed.) *Progress in Old World palaeoethnobotany*: 63–80. Rotterdam: Balkema.

Kıyak T.K. 2022. Çine-Tepecik Geç Tunç Çağı Yerleşmesinde Endüstriyel Kaynakların Ekonomik Yapılandırmadaki Yeri/The role of industrial resources in the economic structure of the Çine-Tepecik Late Bronze Age settlement. *Colloquium Anatolicum* 21: 13–36. https://doi.org/10.58488/collan.1099289

Nesbitt, M. 2017. *Identification guide for Near Eastern grass seeds*. London: Routledge.