

## **Appendix F. Comparative Visual Evidence for Neolithic Symbolic Convergence**

Recent palaeoclimatic and archaeological studies suggest that around 5500 BCE, the Levant underwent rapid aridification. Formerly fertile steppe regions deteriorated into increasingly desertified zones, leading to the depopulation of established settlements and triggering waves of climate-induced migration<sup>1-3</sup>.

One prominent trajectory directed groups southward toward the Nile Valley—a region characterised at the time by stable flood cycles and highly arable alluvial soils. As these incoming groups mingled with indigenous farming communities, a new cultural synthesis emerged: the Badarian culture (4400–4000 BCE), commonly considered the earliest expression of Predynastic Egypt<sup>4,5</sup>.

In parallel, the Vinča culture of the central Balkans (5500–4000 BCE) exhibited symbolic and technological parallels—including burnished black-topped pottery, early metallurgy<sup>6</sup>, and circular lithic structures. These features, illustrated in Figure 5, suggest the possibility of long-distance interaction networks, perhaps mediated through shared Neolithic symbolic grammars or indirect transmission corridors.

Simultaneously, the gradual desiccation of the Sahara after 7000 BCE led to cultural compression within ecological refugia such as Nabta Playa<sup>7-9</sup>. Here, calendrical megaliths and complex burial installations emerged, reflecting both symbolic sophistication and nascent astronomical knowledge.

These converging trajectories—climatic stress, symbolic and technological exchange, and population mobility—likely catalysed the conditions under which Giza’s integrated architectural paradigm may have emerged. In this broader framework, the Badarian black-topped vessels, Vinča symbolic schema, and Nabta Playa’s celestial markers<sup>10</sup> represent constituent threads in a transregional civilisational tapestry.

While the precise chronology and mechanisms of transmission remain subjects of active investigation, this synthesis supports an expanded view of Giza’s origin—one that incorporates

transregional inputs rather than attributing its development solely to endogenous processes within Dynastic Egypt.

**Figure 5. Comparative Iconography and Cultural Parallels between the Vinča Tradition and Predynastic Egypt**



**Note:** Images **A** and **B** are adapted from Jakucs et al.<sup>6</sup> and illustrate burnished black-topped ceramics and symbolic burial practices of the Vinča–LBK transitional horizon. These are shown here under fair academic use for comparative analysis. **C.** Dolni Glavanak Stone Circle, Bulgaria. Adapted from an image hosted on The Megalithic Portal (<https://www.megalithic.co.uk>), submitted by user KaiHofmann and attributed to sladkahapka (Rossi), originally displayed via Flickr under API-based distribution terms. Coordinates: 41.681889° N, 25.812806° E. Shown here under fair academic use for comparative archaeological analysis. **D.** Black-topped red ware jar, Predynastic Egypt (c. 3850–2960 BCE). Adapted from an image provided by the Metropolitan Museum of Art, Accession No. 15.2.26 <https://www.metmuseum.org/art/collection/search/558253>. Released under Creative Commons CC0 1.0 Public Domain Dedication. **E.** Excavation of Grave 1 at Bargat El-Shab, Egypt. The subadult individual is shown in situ during the excavation<sup>10</sup>. **F.** Nabta Playa Calendar Circle (reconstruction at Nubia Museum, Aswan). Photograph by Raymbetz, 21 March 2009. Image released under Creative Commons Attribution-Share Alike 3.0 Unported (CC BY-SA 3.0) license.

## References

1. Palmisano, A., Bevan, A. & Shennan, S. Holocene regional population dynamics and climatic trends in the Near East: A first comparison using archaeo-demographic proxies. *Quaternary Sci. Rev.* 252, 106739 (2021).
2. Großmann, R., Müller-Schneeßel, N. & Obert, M. Demographic dynamics between 5500 and 3500 cal BP in selected study regions of Central Europe: Long-term trends in activity data. *PLOS ONE* 18, e0291956 (2023).
3. Lawrence, D. Climate change and early urbanism in Southwest Asia. *WIREs Clim. Change* 13, e741 (2022).
4. Stevenson, A. The Egyptian Predynastic and State Formation: Estimates now extend Badarian material culture into the earlier part of the fourth millennium BC... *J. World Prehistory* 29, 267–336 (2016).
5. Hassan, F. A. The peopling of the Egyptian Nile Valley: A complex interplay among Saharan, Nilotic and Levantine populations. *J. World Prehistory* (1988).
6. Jakucs, J., Bánffy, E., Oross, K. et al. (2016). Between the Vinča and Linearbandkeramik Worlds: The Diversity of Practices and Identities in the 54th–53rd Centuries cal BC in Southwest Hungary and Beyond. *Journal of World Prehistory*, 29, 267–336. <https://doi.org/10.1007/s10963-016-9096-x>
7. DeMenocal, P. B. African climate change and faunal evolution during the Pliocene–Pleistocene. *Quat. Sci. Rev.* 19, 347–361 (2000).
8. Hassan, F. A. Holocene lakes and prehistoric settlements of the Western Faiyum, Egypt. *Geoarchaeology* 3, 33–50 (1988).
9. Kröpelin, S. et al. Climate-driven ecosystem succession in the Sahara: The past 6000 years. *Science* 320, 765–768 (2008).
10. Srienc, M. T., Bobrowski, P. & Jórdeczka, M. Human remains from Bargat El-Shab, Egypt, 2018. *Bioarchaeol. Near East* 14, 25–40 (2020).

