**Variation in the development of Neolithic societies atop the Central Anatolian Plateau: recent results from Balıklı**

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**I. Supplementary Tables**

**Table S1. 14C determinations at Balıklı (OxCal v.4.4 with IntCal20 at 95.4% probability).**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Sample No.** | **Lab No.** | **14C yr BP** | **14C cal BC** | **Material**  |
| BA1  | AA114115 | 8870±30 | 8221-7844 | Charcoal |
| BA3 | AA114118 | 8970±30 | 8281-7971 | Charcoal |
| BA4 | AA114114 | 8930±30 | 8247-7960 | Charcoal |
| BA11 | AA114123 | 8830 ±30 | 8197-7757 | Charcoal |
| BA15 | AA114116 | 8920±30 | 8239-7960 | Charcoal |
| BA15A | AA114097 | 8920±30 | 8239-7960 | Charcoal |
| BAP1a | AA108885 | 8966±28 | 8280-7968 | Charcoal |
| BAP1b | AA108886 | 8915±28 | 8236-7960 | Charcoal |
| BAP1c | AA108887 | 8961±28 | 8277-7968 | Charcoal |
| BAP1d | AA108888 | 8896±28 | 8224-7956 | Charcoal |
| BA23 | AA114119 | 8980±30 | 8285-7975 | Charcoal |
| BA29 | AA114121 | 8960±30 | 8277-7967 | Charcoal |
| BA30 | AA114120 | 8900±30 | 8228-7956 | Charcoal |
| BASK1-5 | TÜBİTAK-2293 | 8932±42 | 8252-7957 | Human bone |
| BASK10\* | TÜBİTAK-2292 | 5478±32 | 4400-4251 | Human bone |
| BASK13\* | TÜBİTAK-2294 | 2135±30 | 349-51 | Human tooth |

\*represents intrusive burials based on stratigraphy and dates.

**Table S2.** **Sources of knapped obsidian at Balıklı amongst studied sample.**

|  |  |  |  |
| --- | --- | --- | --- |
| **Source** | **Colour and Texture** | **N** | **%** |
| Göllüdağ\* | Transparent bluish | 2692 | 93.7 |
| Nenezi\*\* | Opaque-semi opaque greenish  | 120 | 4.2 |
| Unknown source/s | Opaque black | 42 | 2.2 |
| Opaque reddish-brown | 1 |
| Unidentified  | 19 |
| **Total** |  | **2874** | **100.1** |

\*19km from Balıklı; \*\*7km from Balıklı.

**Table S3.** **Technological analysis of knapped obsidian sample from Balıklı.**

|  |  |  |
| --- | --- | --- |
| **Technological Element** | **N** | **%** |
| Core, core fragment | 23 | 0.8 |
| Opening platform | 6 | 0.2 |
| Tablet | 6 | 0.2 |
| Crested blade | 24 | 0.8 |
| Lateral blade/let | with natural surface | 115 | 7.8 |
| frontal crest | 69 |
| back crest | 40 |
| Central blade/let | unidirectional | 422 | 24.5 |
| bidirectional | 273 |
| unidentified | 23 |
| Trimming blade | 16 | 0.6 |
| Flake like blade | 15 | 0.5 |
| Rejuvenation | blade | 12 | 0.7 |
| flake | 9 |
| Flake | thin | 663 | 38.7 |
| thick | 442 |
| with crest | 7 |
| Chips | 70 | 2.4 |
| Fragment | 538 | 18.7 |
| Burin spall | 41 | 1.4 |
| Microburin | 75 | 2.6 |
| **Total** | **2874** | **99.9** |

**Table S4.** **Sample of formal obsidian tools (by class) and used items analysed at Balıklı.**

|  |  |  |  |
| --- | --- | --- | --- |
| **Tool classes** | **N** | **%** | **%** |
| Scrapers | 11 | 3.4 | 1.9 |
| Burins | 28 | 8.8 | 4.9 |
| Truncated blade/lets | 26 | 8.1 | 4.6 |
| Retouched blade/lets | 182 | 56.9 | 32.1 |
| Pointed blade/lets | 3 | 0.9 | 0.5 |
| Backed blade/lets, elongated lunates | 6 | 1.9 | 1.1 |
| Microliths | 5 | 1.6 | 0.9 |
| Projectile points (Cafer points) | 15 | 4.7 | 2.7 |
| Perforators | 3 | 0.9 | 0.5 |
| Notched blades | 1 | 0.3 | 0.2 |
| Denticulates | 1 | 0.3 | 0.2 |
| Retouched flakes | 36 | 11.3 | 6.4 |
| Splintered pieces | 3 | 0.9 | 0.5 |
| **Formal tools total:** | **320** | **100** |  |
|  |  |  |  |
| Used blade/lets | 229 | 92.7 | 40.4 |
| Used flakes | 18 | 7.3 | 3.2 |
| **Used items total:** | **247** | **100** |  |
|  |  |  |  |
| **Grand total:** | **567** |  | **100** |

**Table S5. Counts of plant remains represented at Balıklı.**

|  |  |  |  |
| --- | --- | --- | --- |
| **Taxonomic Category** | **Remain Type** | **Preservation** | **Count** |
| ***Cereal Chaff*** |  |  |  |
| *Triticum turgidum/timopheevii/monococcum-*  indeterminate*\** | Chaff | Carbonized | 235 |
| *T.* *turgidum* subsp. *dicoccoides/dicoccum* | Chaff | Carbonized | 79 |
| *T*. *turgidum* subsp. *dicoccoides*/*dicoccum* /  *T. timopheevii araraticum/timopheevii*\*\* | Chaff | Carbonized | 33 |
| *T*. *turgidum* subsp. *dicoccoides*/*dicoccum* / *T. timopheevii* *araraticum*/*timopheevii*\*\* | Terminal spikelet | Carbonized | 10 |
| *Triticum* indeterminate | Chaff | Carbonized | 3 |
| Cereal indeterminate | Chaff | Carbonized | 1 |
| ***Cereal Grain*** |  |  |  |
| *Triticum turgidum/timopheevii/monococcum*- indeterminate\* | Grain | Carbonized |  |
| *Triticum* sp- indeterminate | Grain | Carbonized | 6 |
| Cereal - indeterminate | Grain | Carbonized | 14 |
| ***Pulses*** |  |  |  |
| Large-seeded pulse | Seed | Carbonized | 5 |
| cf *Lens* sp. | Seed | Carbonized | 1 |
| ***Nuts/Fruits*** |  |  |  |
| Nuts/Fruits indeterminate (MNI) | Nutshell/Fruitstone | Carbonized | 6 |
| *Amygdalus*/*Prunus* sp. (MNI) | Nutshell | Carbonized | 4 |
| cf *Pistacia* sp. (MNI) | Nutshell | Carbonized | 4 |
| *Celtis* sp. Whole | Fruitstone | Carbonized | 1 |
| ***Nuts/Fruits*** |  |  |  |
| Celtis sp. (MNI) | Fruitstone | Mineralized | 229 |
| *Celtis* sp. Whole | Fruitstone | Mineralized | 20 |
| ***Wild Taxa*** |  |  |  |
| Caryophyllaceae | Seed | Carbonized | 5 |
| Cyperaceae | Seed | Carbonized | 2 |
| Fabaceae | Seed | Carbonized | 4 |
| Poaceae small-seeded | Seed | Carbonized | 2 |
| Poaceae large-seeded | Seed | Carbonized | 2 |
| Poaceae | Chaff | Carbonized | 2 |
| *Taeniatherum caput-medusae* | Chaff | Carbonized | 3 |
| *Taeniatherum caput-medusae* | Seed | Carbonized | 1 |
| ***Wild Taxa*** |  |  |  |
| Boraginaceae | Nutlet | Mineralized | 381 |
| ***Other Remains*** |  |  |  |
| cf Onion/Bulb (MNI) | Underground storage organ | Carbonized | 2 |
| Reed culm node (MNI) | Stem | Carbonized | 1 |
| **Carbonized Total** |  |  | **430** |
| **Mineralized Total**  |  |  | **401** |
| **Grand Total** |  |  | **831** |

For chaff remains, each glume base was counted as 1. The other remains were quantified following the procedure for MNI (minimum number of items) outlined in Ergun *et al* (2018).

\*Glume wheat indeterminate category

\*\*Emmer/NGW category

**Table S6.** **Number of Identified Specimens (NISP) (a) and percentage counts (b) for ungulates assigned to the family and species level.**

(a)

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Taxon (NISP)** | **Pınarbaşı** | **Boncuklu** | **Balıklı**  | **Aşıklı L5** | **Aşıklı L4** |
| Cervidae | 3 | 17 | 18 | 109 | 237 |
| *Bos* *primigenius* | 92 | 169 | 263 | 658 | 1322 |
| *Sus* *scrofa* | 16 | 258 | 25 | 315 | 663 |
| Caprinae | 72 | 20 | 311 | 1374 | 6284 |
| Equidae | 18 | 46 | 213 | 92 | 410 |
| **Total** | **201** | **510** | **830** | **2548** | **8916** |

(b)

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Taxon (%)** | **Pınarbaşı** | **Boncuklu** | **Balıklı**  | **Aşıklı L5** | **Aşıklı L4** |
| Cervidae | 1 | 3 | 2 | 4 | 3 |
| *Bos* *primigenius* | 46 | 33 | 32 | 26 | 15 |
| *Sus* *scrofa* | 8 | 51 | 3 | 12 | 7 |
| Caprinae | 36 | 4 | 37 | 54 | 70 |
| Equidae | 9 | 9 | 26 | 4 | 5 |

Comparative data from Pınarbaşı (10th/9th millenium level) and Boncuklu from Baird *et al*. (2019); and Aşıklı Level 4 (Level 4 and Level 4 lower combined) and Level 5 from (Stiner *et al*. 2022). All equids are wild ass probably *Equus hemionus*. Caprines include sheep (*Ovis* sp.) and goat (*Capra* sp.).

**Table S7. Similarities and differences in material culture between Early Holocene sites in Central Anatolia.**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Material Type** | **Balikli** | **Aşikli 4-5** | **Sofular** | **Boncuklu lower** | **Pinarbaşi A** |
| Chronology | 8200-7900 BC | 8350-8050 BC | 8200-7600 BC | 8300-8100 BC | 8800-8000 BC |
| Architecture | Subterranean oval | Subterranean oval | present? | Subterranean oval | Subterranean oval |
| Roofing | 5-6 large posts | Central large post & smaller posts around periphery | ? |  |  |
| Ventilation shaft | + | + | ? | - | ? |
| Construction | Daub, marl, mortar | *Kerpiç* | *Kerpiç*? | *Kerpiç* | Wattle & daub |
| Foundation deposits | Burials, caches | ? | ? | caches | ? |
| Open-area plastering | ++ | ? | ? | - | ? |
| GST Cup-mortar | ++ | ? | - | - | + |
| GST Quern with cupule | +++ | - | ? | - | ? |
| Lithics – mbt | +++ | Mbt | +++ | mbt | ? |
| Cafer-type points | ++ | + | + | + | ? |
| Microliths | ++ | ++ | ++ | + | + |
| Polished axes | ++ | + | ? | ? | + |
| Geometric tokens | - | + |  | ++ | ? |
| Shaft-straighteners | + | + | ? | + | + |
| Seashells | *Tritia + Dent* | *Tritia* | ? | *Tritia + Dent* | *Tritia + Dent* |
| Deer tooth pendants | - | + | - | - | - |
| Butterfly bead | + | + | - | + |  ? |

*Kerpiç*: Sun-dried mudbrick; GST: Groundstone tools; *Tritia -* formerly *Nassarius;* Dent *– Dentalium*

**II. Supplementary Figure**

*Figure S1. Ungulate percentages for Balıklı and contemporary sites on the Anatolian Plateau, sample sizes and references in Table S6. Values on the y-axis are percentages.*

**III. Supplementary Text**

**Faunal sample**

More than 1800 faunal specimens from Balıklı have been identified to date. Given that analysis is ongoing, the sample reported here represents only a portion of what will ultimately be a much larger assemblage. This preliminary sample is limited in two notable ways: (a) its areal and temporal scope—since the sampled material was excavated in one season (2019), and (b) the body-size range of identified animals. While the material recovered during excavation has been fully studied, the fauna from the water flotation takes longer to process and thus has only been partially studied thus far. Given that the average size of bone fragments from the dry-sieved sediment is significantly larger than fragments from the flotation heavy residue, the bones of small animals (fish, in particular) are under-represented in the dry-sieved fraction (also see comparison of the taxonomic composition of fauna recovered from dry-sieved and flotation samples from Aşıklı Höyük which followed a similar excavation, sampling and analytical strategy; Stiner *et al*. 2022: sup. mat. fig.3). Given that the flotation heavy residue has not been completely studied, small game are under-represented in the sample, and thus quantitative data are provided only for the ungulate taxa that have been assigned to at least the family level or better, with the added caution that even these numbers will change slightly when the ungulates recovered from the remainder of the flotation heavy residue are added. The brief summary provided on the small animals in the text provides only a taxon list and a minimum percentage for the small game fraction of the assemblage—final NISPs are pending completion of the analysis of the flotation heavy residue.

**IV. References for Supplementary Materials**

Baird, D. *et al*. 2018. Agricultural origins on the Anatolian plateau. *Proceedings of the National Academy of Sciences USA* 115: E3077–E3086. https://doi.org/10.1073/pnas.1800163115

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Stiner, M.C., N.D. Munro, H. Buitenhuis, G. Duru & M. Özbaşaran. 2022. An endemic pathway to sheep and goat domestication at Aşıklı Höyük (Central Anatolia, Turkey). *Proceedings of the National Academy of Sciences USA* 119. https://doi.org/10.1073/pnas.2110930119