

## Supplementary Materials

### **A genomic snapshot of demographic and cultural dynamism in Upper Mesopotamia during the Neolithic Transition**

N. Ezgi Altınışik<sup>1†\*</sup>, Duygu Deniz Kazancı<sup>1,2†</sup>, Ayça Aydoğan<sup>1</sup>, Hasan Can Gemici<sup>3</sup>, Ömür Dilek Erdal<sup>4</sup>, Savaş Sarıaltun<sup>5</sup>, Kıvılcım Başak Vural<sup>2</sup>, Dilek Koptekin<sup>2,6</sup>, Kanat Gürün<sup>2</sup>, Ekin Sağlıcan<sup>2,6</sup>, Gökhan Çakan<sup>4</sup>, Meliha Melis Koruyucu<sup>4</sup>, Vendela Kempe Lagerholm<sup>7,8</sup>, Cansu Karamurat<sup>3</sup>, Mustafa Özkan<sup>2</sup>, Gülşah Merve Kılınç<sup>9</sup>, Arda Sevkar<sup>1,2</sup>, Elif Sürer<sup>10</sup>, Anders Götherström<sup>7,8</sup>, Çiğdem Atakuman<sup>3</sup>, Yılmaz Selim Erdal<sup>1,4 ‡</sup>, Füsün Özer<sup>1‡</sup>, Aslı Erim Özdoğan<sup>11‡</sup>, Mehmet Somel<sup>2‡\*</sup>

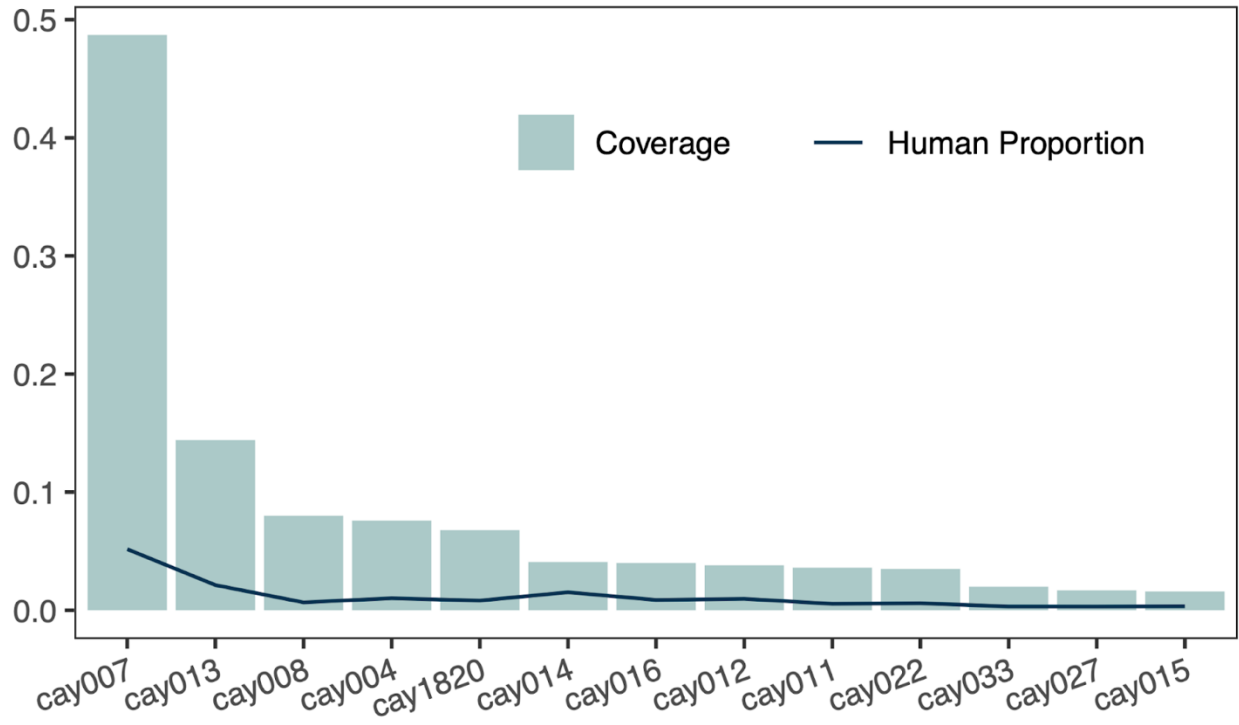
\*Corresponding authors

#### **This PDF file includes:**

Figs. S1 to S6  
Table S1

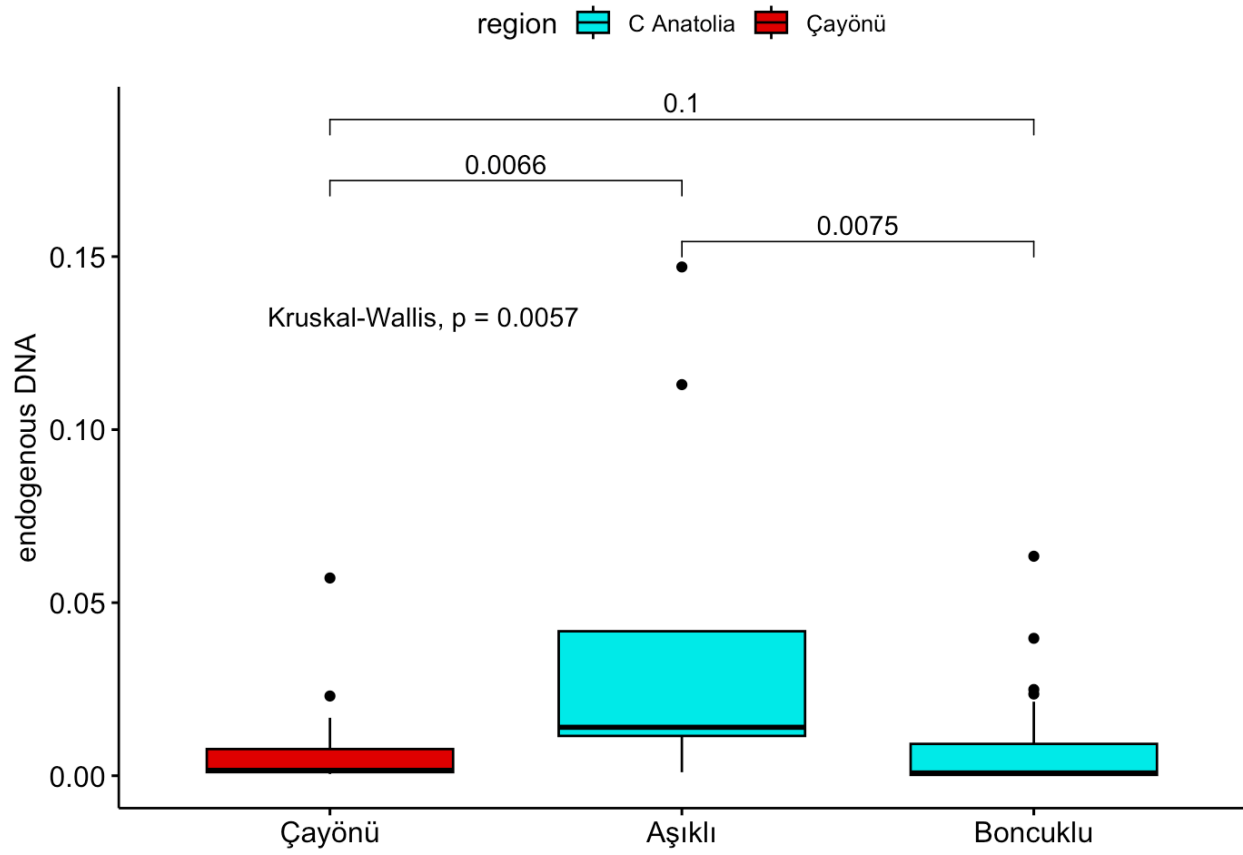
**Fig. S1.**

Human proportion and coverage of the deep-sequenced specimen from the Çayönü population.



**Fig. S2.**

Comparison of the DNA preservation in Çayönü and contemporary Central Anatolia sites, Aşıklı and Boncuklu.



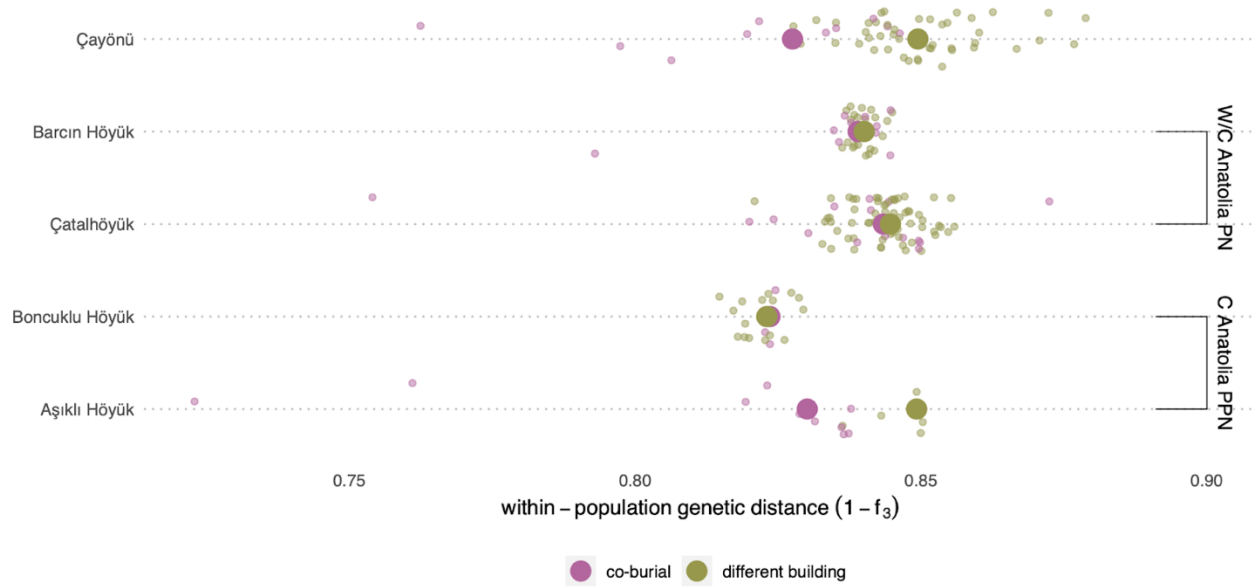
**Fig. S3.**

Principal Component Analysis (PCA) of Southwest Asian early Holocene populations which were projected onto 55 present-day West Eurasian populations. While a Southern Levant Neolithic individual (KFH2\_KFH002) falls into the Anatolian cluster which is consistent with (6), a Çayönü individual (cay015) with 6,986 SNPs appears in the Southern Levant cluster. This individual has the lowest coverage in our sample. The outlier individual (cay008) has been labelled in the figure.



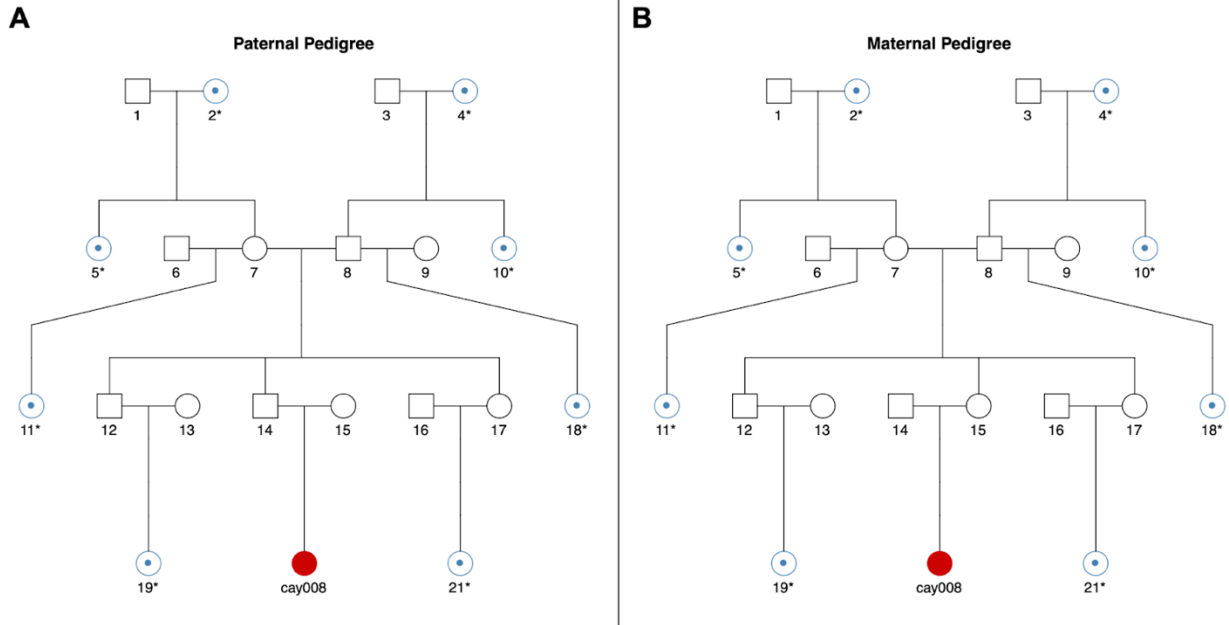
**Fig. S4.**

Comparison of genetic diversity ( $1 - f_3$ ) of co-buried individuals in Central Anatolia and Çayönü.



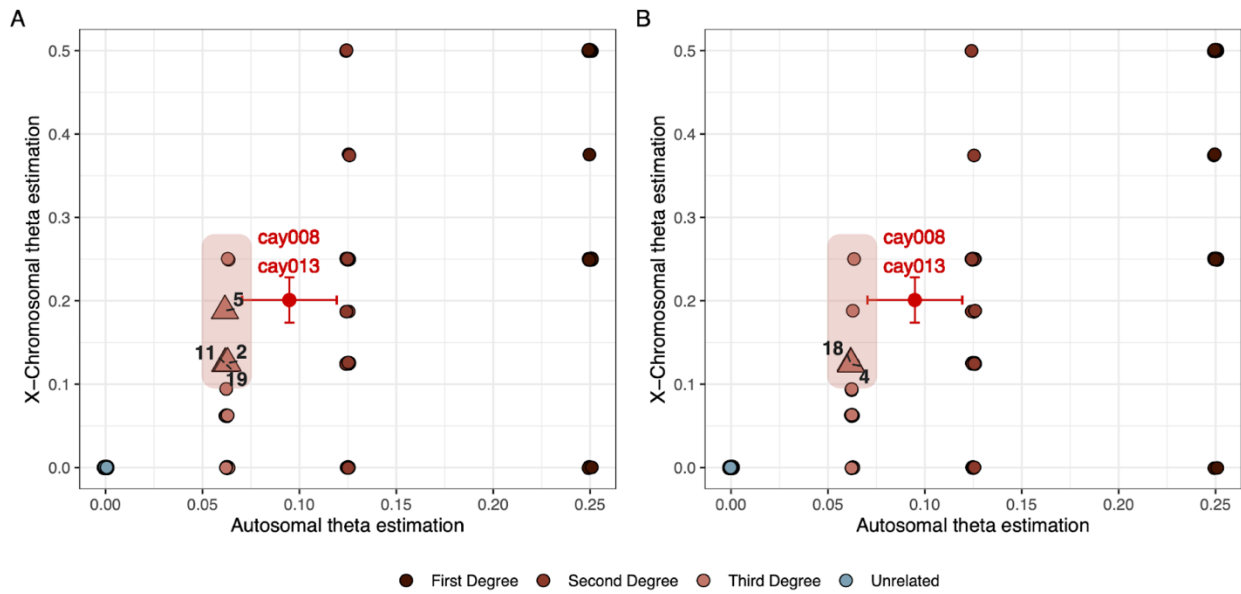
**Fig. S5.**

Simulated pedigrees for **(A)** paternal and **(B)** maternal relatives of cay008 to resolve her relationship with cay013 who is an adult female. Blue circles with dots correspond to the possible female third-degree relatives of cay008. Given that cay008 is an infant all relatives were simulated as related through the mother or father but not as descendants.



**Fig. S6.**

Theoretical kinship coefficient ( $\theta$ ) values between cay008 and her (A) paternal and (B) maternal relatives. Autosomal  $\theta$  values are on the x-axes while X-chromosomal  $\theta$  values are on the y-axes. The orange-shaded area shows potential values similar to real data where X-chromosomal  $\theta$  is higher than autosomal  $\theta$ . Red dots represent  $\theta$  values  $1 - \text{Normalised } P_0$  between cay008 and cay013 individuals, whereas horizontal and vertical bars infer 95% confidence intervals. Triangles show the potential female relatives falling in this range. Annotated numbers correspond to relatives in the two pedigrees shown in Supplementary Figure 5. Jitter was added to the points to visualize all the data.



**Table S1.**

Archaeological contexts and anthropological characteristics of all screened Çayönü individuals.

Building	Sub-phase	DNA lab No	DNA Preservation	Skeleton Number	Genetic Sex	Age at Death	Burial Type	Basic Pathologies
CA	c1 (PPNB)	cay001	-	ÇT'86 S.1	Male	40-45 years old (Middle Adult)	Tightly flexed, NNE-SSW oriented, lying R, face down	Slightly developed osteoarthritis (OA) on the hip and shoulder joints; moderate arthritic changes in thoracic and lumbar vertebrae and knee joint. New bone formation on the internal table of the cranium and pelvic bones.
CA	c1 (PPNB)	cay002	-	ÇT'78 S.12	Unknown	11-12 years old (Child)	Tightly flexed, primary, NE-SW oriented, lying R, face down	A healed depressed trauma on the right parietal bone; moderate cribra orbitalia on the right orbital roof.
CXa	c3 or c1 (PPNB)	cay003	-	ÇT'72 S.10a	Female	35-45 years old (Middle Adult)	Flexed, primary, W-E oriented, lying L, face S	A healed fracture on left big toe.
CL	c1(PPNB)	cay004	+	ÇT'78 S.16	Female	33-46 years old (Middle adult)	Partially flexed W-E oriented, lying L, face SW	Healed fracture on the distal end of left ulnae; Monteggia fracture on right ulnae; periostitis on fibulae, slightly porotic hyperostosis on the cranium; slightly developed osteoarthritis on proximal end ulnae; Schmorl's nodule on 5th lumbar vertebrae.
CR	c3 (PPNB)	cay005	-	ÇT'78 S.9	Male	Adult (>15)	It was excavated between walls	Three healed depressed fractures (one of them is on the midline of the frontal bone and two of them are left parietal bone; slightly developed PH; severe osteoarthritic changes on the cervical vertebrae.



CXa	c1(PPNB)	cay006	-	ÇT'81 S.6	Unknown	4-5 years old (Child)	-	-
GE	Mid g (PPNA- PPNB transition)	cay007	+	ÇT'81 S.2a	Male	20-23 years old (Young adult)	Flexed, NW-SE oriented, lying R	A healed depressed trauma on right parietal bone and a healed fracture on 5th phalanges of the foot; slightly developed osteoarthritis on the right foot bones.
CA	c1 (PPNB)	cay008	+	ÇT'86 S.2	Female	1-2 years old (Infant)	Flexed?, skull in W	Cauterization; circular type intentional head-shaping with post-coronal depression; woven bone formation on inner surface of the occipital bone.
CXa	c3 or c1 (PPNB)	cay009	-	ÇT'72 S.8b	Female	2-4 years old (Child)	Unknown, represented by teeth (she was found with ÇT'72 S.8a)	-
CN	c1 (PPNB)	cay010	-	ÇT'78 S.2	Unknown	2-2,5 years old (Infant)	Flexed	Severe hypoplasia; Possible head-shaping with the sign of post-coronal depression.
CN	c1 (PPNB)	cay011	+	ÇT'78 S.7	Male	33-42 years old (Middle adult)	Flexed, primary, SSE-NNW oriented, lying L, face down	Two healed depressed trauma (one of them is on left parietal and the other is on the frontal); healed periostitis on tibiae; Healed fracture on the left big toe, slightly osteoarthritis on the right ulnae and severe on cervical vertebrae.
CN	c1 (PPNB)	cay012	+	ÇT'78 S.6	Male	Nearly 12 years old (Child)	Tightly flexed, primary, SE-NW oriented, lying L, face down	Possible Scurvy? New bone formation is observed around the muscular attachment of all long bones and porosity on the ramus of the mandible.

CA	c1 (PPNB)	cay013	+	ÇT'78 S.21	Female	43-58 years old (Old adult)	Tightly flexed, NNE-SSW oriented, lying R, face down	Depressed trauma on the occipital; A fracture left costa, and periostitis on this fragment; slightly developed porotic hyperostosis and cribra orbitalia; slight osteoarthritis on the hand and foot phalanges; A possible head-shaping with a plano-occipital flattening.
CL	c1(PPNB)	cay014	+		Female	Adult	-	-
CL	c1(PPNB)	cay015	+	ÇT'81 S.15	Female	40-45 years old (Middle adult)	Flexed, primary, SSW-N oriented, lying R, face W	A healed Colles' fracture on the left radius; a healed fracture on medial foot phalange; periostitis on sacrum, slight porotic hyperostosis and cribra orbitalia; slight osteoarthritis on the distal radius, thoracic and lumbar vertebrae.
CL	c1(PPNB)	cay016	+	ÇT'81 S.8	Female	40-55 years old (Old adult)	Tightly flexed, S-N oriented, lying on the R	A healed Colles' fracture on the left radius; moderate porotic hyperostosis and cribra orbitalia; severe osteoarthritis on the left wrist bones, slightly on the right shoulder, moderate on the thoracic and severe on the lumbar vertebrae.
CV (CXa)	c3 or c1 (PPNB)	cay017	-	ÇT'70 S.3	Female	28-37 years (Middle Adult)	Tightly flexed, S-N oriented, lying R, face SW	Cribra orbitalia on the left orbital roof.
GB(b)	g (upper) (early PPNB)	cay018	+	ÇT'70 S.13	Female	3-9 months (Infant)	Flexed, partly twisted, primary, SW-ENE oriented, lying R	No pathology observed.
GB(b)	g (upper) (early PPNB)	cay019	-	ÇT'70 S.10a	Female	Adult (>15)	Flexed, primary, ENE-WSW oriented, lying R	Healed depressed trauma on the R parietal bone; Hyperostosis frontalis interna; Disease idiopathic skeletal

								hyperostosis and intentional head-shaping with a post-coronal depression.
GB(b)	g (upper) (early PPNB)	cay020	+	ÇT'70 S.11b	Female	3-9 months (Infant)	Flexed, primary, lying R	Severe PH on parietal; infection on internal surface of occipital.
CXa	c1(PPNB)	cay021	-	ÇT'72 S.9a	Female	Adult (>15)	Flexed, W-E oriented, lying R	Healed depressed trauma on the bregma region.
CR	c3 or cp3 (PPNB)	cay022	+	ÇT'78 S.25	Female	9-12 months(Infant)	-	New bone formation on the internal table of the cranium; moderate porotic hyperostosis.
CA	c1 (PPNB)	cay023	-	ÇT'72 S.5	Female	8-8,5 years (Child)	Flexed, secondary, NE-SW oriented, lying R, face E	Slight cribra orbitalia in both orbital roof.
CA	c1 (PPNB)	cay024	-	ÇT'78 S.20	Female	Middle adult	Tightly flexed, SE- NW orientation, lying L ?, face down	Slight porotic hyperostosis and cribra orbitalia. Osteoarthritic changes on cervical vertebrae.
CA	c1 (PPNB)	cay025	-	ÇT'78 S.13	Male	Adult (>15)	Tightly flexed, NNW-SSE oriented, lying R, face down	Healed fracture on the right 2nd and 3th metacarpal and distal phalanges, slight osteoarthritis on the right distal radius.
21N	c2 (PPNB)	cay026	-	ÇT'78 S.28b	Female	Old adult	-	Two healed depression trauma on the cranium (one is on the left frontal tuber and other is on the occipital; hyperostosis frontalis interna; slight osteoarthritis on right shoulder; moderate on the cervical vertebrae.
CN	c1(PPNB)	cay027	+	ÇT'78 S.1	Female	Adult (>15)	Flexed? secondary? SW-NE oriented, face?	Infection on the right tibia.

CL	c1 (PPNB)	cay028	-	ÇT'78 S.17	Female	22-24 years (Young adult)	Semi flexed, N-S directed lying on right side and partially on stomach	Slight porotic hyperostosis.
CA	c1 (PPNB)	cay029	-	ÇT'78 S.19	Female	40-45 years (Middle adult)	Tightly flexed, SSW-NNE oriented, lying on the left side	Healed depressed trauma on the skull, maxillary sinusitis; periostitis on the right tibia; slight osteoarthritis on cervical vertebrae.
CXa	c1 (PPNB)	cay030	-	ÇT'81 S.7	Female	Adult (>15)	Flexed	Healed depressed trauma on the right parietal.
CXa	c1 (PPNB)	cay031	-	ÇT'81 S. 4	Male	Adult (>15)	Flexed	Two healed depressed trauma on the right parietal bone and slight porotic hyperostosis.
GE	Mid g (PPNA- PPNB transition)	cay032	-	ÇT'81 S.2b	Male	Young adult	Together with 81 S.2a	Two healed fractures on the right foot bones; periostitis on the right tibia.
CL	c1 (PPNB)	cay033	+	ÇT'84 S.60	Male	8-8,5 years (Child)	Under 81 S.15 (cay016)	Hematoma on the left femoral diaphysis.