Figure S1. ADMIXTURE analysis results with ancient data projected onto the modern genetic structure. Related to Figure 1. A. Ancient individuals at K9. B. Modern population averages at K9. C. Ancient individuals at K3 to K18. D. Modern population averages at K3 to K18.

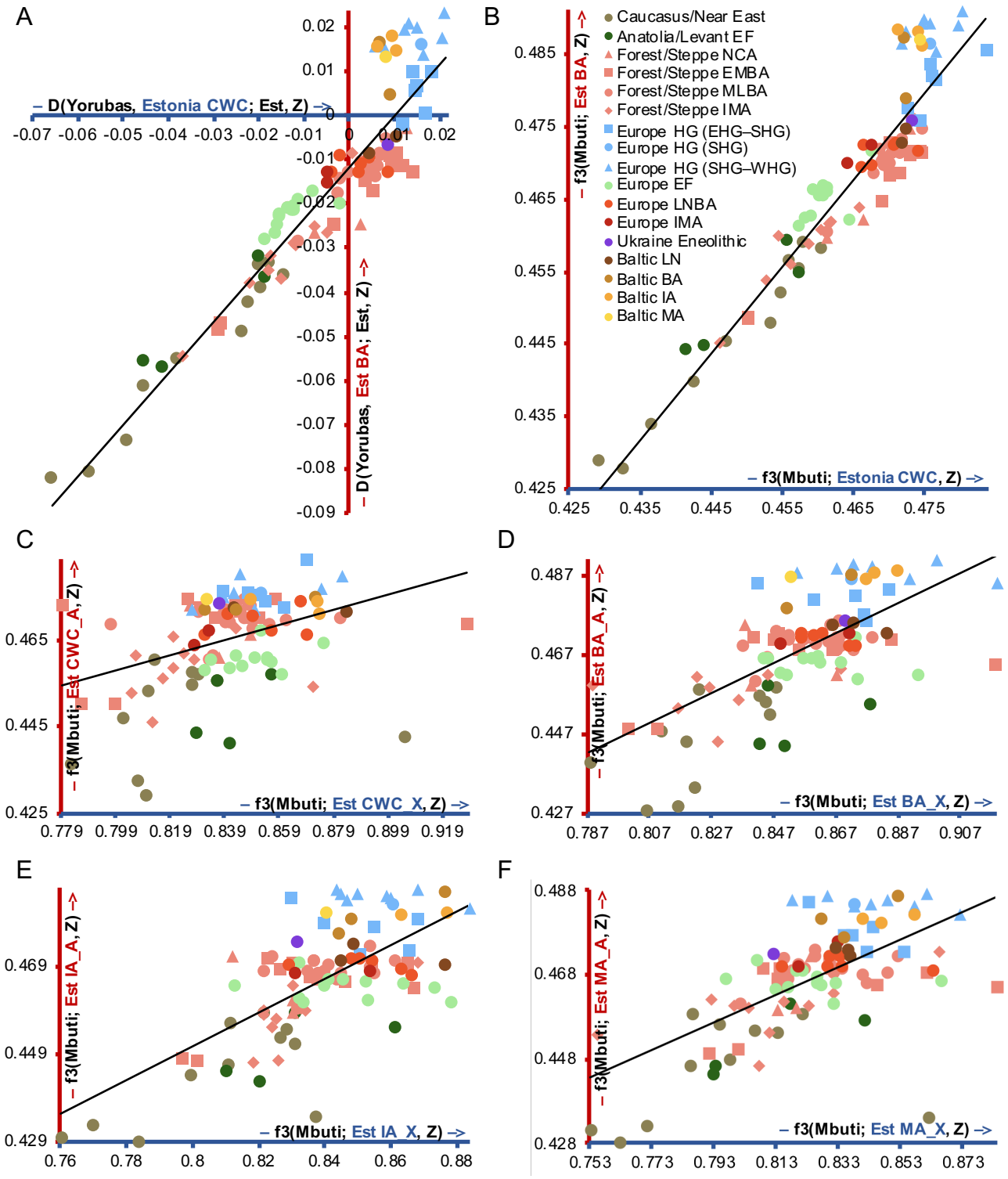

Figure S2. D and outgroup f3 statistics' results. Related to Figure 2. EF – early farmers; HG – hunter-gatherers; LNBA – Late Neolithic/Bronze Age; IMA – Iron/Middle Ages; LN – Late Neolithic; BA – Bronze Age; IA – Iron Age; MA – Middle Ages. A. D statistics' values of form D(Yorubas, Estonian Corded Ware culture/Bronze Age; Estonians, ancient). B. Outgroup f3 statistics' values of form f3(Mbuti; Estonian Corded Ware culture/Bronze Age, ancient) using 1240k capture SNPs. C–F. Outgroup f3 statistics' values of form f3(Mbuti; autosomal SNPs/chr X SNPs, modern) of Estonian Corded Ware culture, Bronze Age, Iron Age and Middle Ages respectively using 1240k capture SNPs.

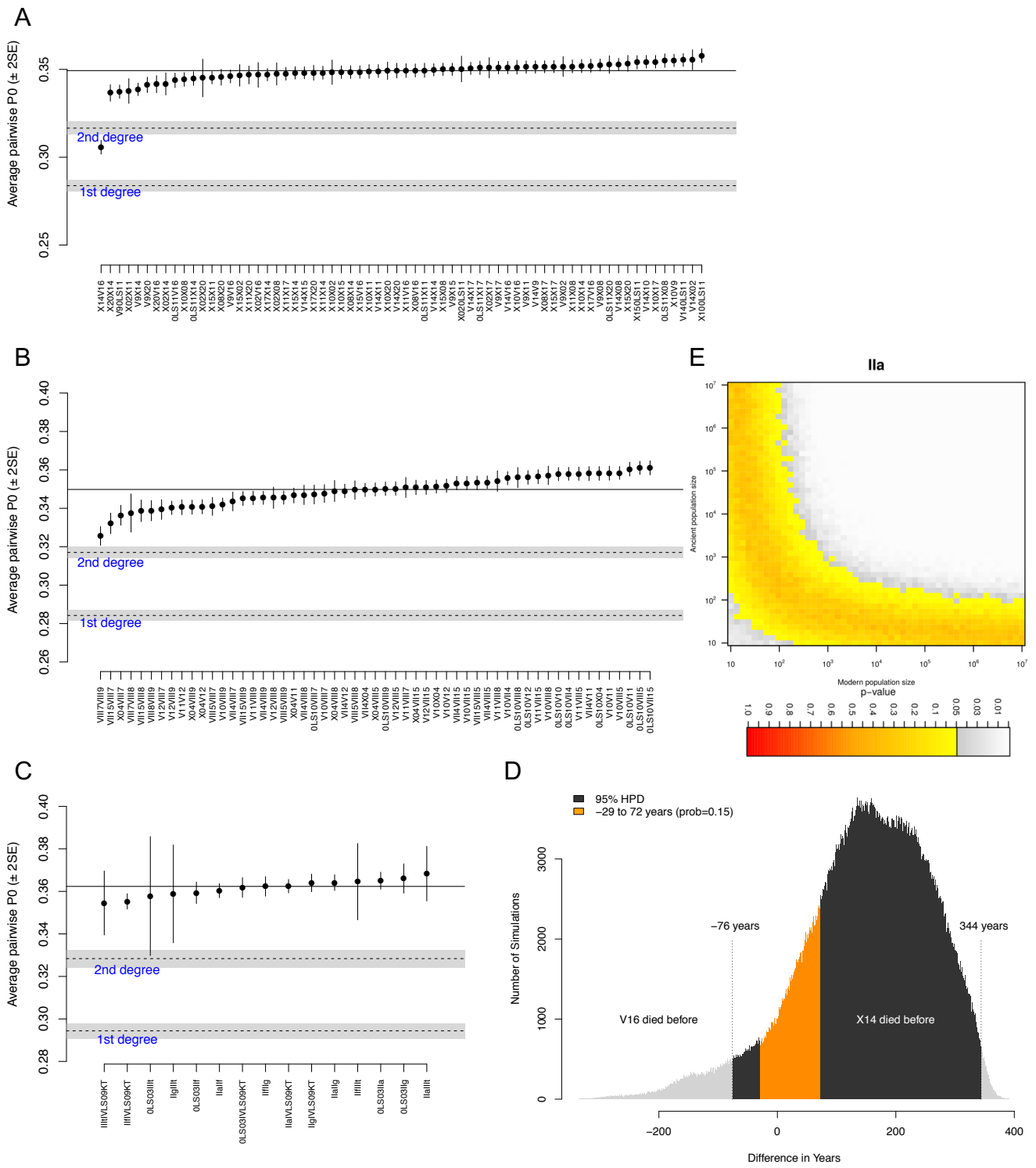

Figure S3. Kinship test results, date difference probability estimation for found relatives and continuity test results. Related to Table 1. A. Bronze Age Estonian kinship test results. B. Iron Age Estonian and Ingrian kinship test results. C. Middle Age Estonian kinship test results. D. Probabilistic estimate for the distance in time between the radiocarbon dates associated with X14 and V16 obtained via one million MC simulations of calendar dates. E. Continuity test results between a Middle Age Estonian genome and modern Estonians.

Modern population	References	PCA	f3, D	ADM, CP	Ancient population	References	PCA	f3, D	ADM
Abkhasians	[S15]	+	+	+	Afanasievo	[S16,S17]	+	+	+
Adygei	[S18]	+	+	+	Aktogai_MLBA	[S17]	+	+	+
Altaians	[S19,S20]		+	+	Alan	[S21]	+	+	+
Armenians	[S15]	+	+	+	Anatolia_ChL	[S16]	+	+	+
Azeris	[S22]	+	+	+	Anatolia_N	[S16]	+	+	+
Balkars	[S15]	+	+	+	Andronovo	[S16,S21]	+	+	+
Balochi	[S18]			+	Armenia_ChL	[S16]	+	+	+
Bantus	[S18]			+	Armenia_EBA	[S16]	+	+	+
Bashkirs	[S22]		+	+	Armenia_MLBA	[S16]	+	+	+
Basques	[S18]	+	+	+	Bell_Beaker	[S16]	+	+	+
Belorussians	[S23,S24]	+	+	+	Bichon	[S16]	+	+	+
Brahui	[S18]			+	Bolshoy Oleni Ostrov	[S25]	+	+	+
Bulgarians	[S15]	+	+	+	Botai	[S26]	+	+	+
Burusho	[S18]			+	Cardial_EN	[S16]	+	+	+
Buryats	[S19]		+	+	Central_LNBA	[S16]	+	+	+
Chechens	[S15]	+	+	+	Central_MN	[S16]	+	+	+
Chukchis	[S19,S27]		+	+	CentralSteppe_EMBA	[S26]	+	+	+
Chuvash	[S23]		+	+	Chalmny Varre	[S25]	+	+	+
Cypriots	[S23]	+	+	+	CHG	[S16]	+	+	+
Daur	[S18]		+	+	Dali_MLBA	[S17]	+	+	+
Dolgans	[S19,S27]		+	+	Dashti_Kozy_BA	[S17]	+	+	+
Erza	[S15]			+	EHG	[S16,S28]	+	+	+
Estonians	[S20,S24,S29]	+	+	+	Estonia_CCC	[S28,S30]	+	+	+
Ethiopians	[S23]			+	Estonia_CWC	[S28,S30]	+	+	+
Evenkis	[S19]		+	+	Estonia_HG	[S28,S30]	+	+	+
Evens	[S20,S27]		+	+	Globular_Amphora	[S31]	+	+	+
Finns	[S29]	+	+	+	HallstattBylany	[S21]	+	+	+
French	[S18]	+	+	+	Hungarian_Med	[S21]	+	+	+
Gagauzes	[S15,S29]	+	+	+	HungarianScythian	[S21]	+	+	+
Germans	[S15,S29]	+	+	+	Hungary_BA	[S16]	+	+	+
Han	[S18]		+	+	Hungary_EN	[S16]	+	+	+
Hazara	[S18]			+	Iberia_BA	[S16]	+	+	+
Hezhen/Nanaj	[S18]		+	+	Iberia_Chl	[S16]	+	+	+
Hungarians	[S23]	+	+	+	Iberia_EN	[S16]	+	+	+
Ingrian_Finns	[S29]	+	+	+	Iberia_MN	[S16]	+	+	+
Iranians	[S23]		+	+	Iran_ChL	[S16]	+	+	+
Japanese	[S18]		+	+	Iran_HotuIIIb	[S16]	+	+	+
Jordanians	[S23]	+	+	+	Iran_LN	[S16]	+	+	+
Kalmyks	[S22]		+	+	Iran_N	[S16]	+	+	+
Karelians	[S15,S29]	+	+	+	Iron_Gates_HG	[S31]	+	+	+
Kazakhs	[S20]		+	+	Kairan_MLBA	[S17]	+	+	+
Kets	[S19,S27]		+	+	Kangju	[S21]	+	+	+
Khakases	[S27]		+	+	Karagash_MLBA	[S17]	+	+	+
Khanty	[S29]		+	+	Kashkarchi_BA	[S17]	+	+	+
Komis	[S22]		+	+	Kazakh_His	[S21]	+	+	+
Koryaks	[S19,S27]		+	+	Kazakh_Mys_MLBA	[S17]	+	+	+
Kumyks	[S15]	+	+	+	Kostenki	[S16]			+
Kurds	[S15]		+	+	Krasnoyarsk_MLBA	[S17]	+	+	+
Kyrgyzians	[S20]		+	+	Latvia_BA	[S28]	+	+	+
Latvians	[S24,S29]	+	+	+	Latvia_CCC_EHG	[S31,S32]	+	+	+
Lebanese	[S23]	+	+	+	Latvia_CCC_WHG	[S31,S32]	+	+	+
Lezgins	[S23]	+	+	+	Latvia_CWC	[S32]	+	+	+
Lithuanians	[S23]	+	+	+	Latvia_HG	[S31,S32]	+	+	+

Makrani	[S18]			+
Malayan	[S23]			+
Mandenkas	[S18]			+
Mansis	[S29]		+	+
Maris	[S20,S29]		+	+
Moksha	[S15]			+
Mongola	[S18]		+	+
Mongolians	[S19]		+	+
Mordovians	[S15]	+	+	+
Moroccans	[S23]			+
Mozabites	[S18]			+
Nenets	[S22]		+	+
Nganasans	[S19]		+	+
Nivkhs	[S27]		+	+
Nogais	[S15]		+	+
North_Italians	[S18]	+	+	+
North_Kannadi	[S19]			+
North_Ossetians	[S15]	+	+	+
northwest_Mingrelians	[S23]	+	+	+
Orcadians	[S18]	+	+	+
Oroqens	[S18]		+	+
Palestinians	[S18]	+	+	+
Paniya	[S23]			+
Pathan	[S18]			+
Poles	[S33]	+	+	+
Portugese	[S29]	+	+	+
Romanians	[S23]	+	+	+
Russians_Central	[S22,S23]	+	+	+
Russians_North	[S18,S22–S24]	+	+	+
Russians_South	[S22]	+	+	+
Saami_Kola	[S29]		+	+
Saami_SWE	[S29]		+	+
Sakilli	[S23]			+
Sardinians	[S18]	+	+	+
Saudis	[S23]			+
Selkups	[S19,S20]		+	+
Shors	[S27]		+	+
Sindhi	[S18]			+
Slovaks	[S24]	+	+	+
Spaniards	[S23]	+	+	+
Swedes	[S29,S33]	+	+	+
Syrians	[S23]	+	+	+
Tajiks	[S15]		+	+
Tatars	[S15,S29]		+	+
Tu	[S18]		+	+
Turkmens	[S15]		+	+
Turks	[S23]	+	+	+
Tuscans	[S18]	+	+	+
Tuvinians	[S19,S22]		+	+
Udmurts	[S22]		+	+
Ukrainians	[S15]	+	+	+
Uygurs	[S18]		+	+
Uzbeks	[S20,S23]		+	+
Vepsas	[S15,S29]	+	+	+
Welsh	[S29]	+	+	+

LBK_EN	[S16]	+	+	+
LchashenMetsamor	[S21]	+	+	+
Levant_BA	[S16]	+	+	+
Levant_N	[S16]	+	+	+
Lisakovskiy_MLBA_Alakul	[S17]	+	+	+
Lithuania_BA	[S28]	+	+	+
Lithuania_CWC	[S28]	+	+	+
Lithuania_HG	[S28]	+	+	+
Levänluhta	[S25]	+	+	+
Maitan_MLBA_Alakul	[S17]	+	+	+
Mal'ta	[S16]			+
Natufian	[S16]	+	+	+
NLithuania	[S21]	+	+	+
Northern_LNBA	[S16]	+	+	+
Okunevo_EMBA	[S26]	+	+	+
Oy_Dzhaylau_MLBA	[S17]	+	+	+
Petrovka	[S17]	+	+	+
Poltavka	[S16,S17]	+	+	+
Poprad	[S21]	+	+	+
Potapovka	[S16,S17]	+	+	+
Remedello	[S16]	+	+	+
Romania_HG	[S31]	+	+	+
Russia_EBA	[S16]	+	+	+
SaltovoMayaki	[S21]	+	+	+
Samara_Eneolithic	[S16]	+	+	+
Sarmatian	[S21]	+	+	+
Sarmatian_SU	[S34]	+	+	+
Scythian_East	[S34]	+	+	+
Scythian_IA	[S16]	+	+	+
SHG	[S16,S28]	+	+	+
SidelkinoEHG_ML	[S26]	+	+	+
Sintashta	[S16,S17]	+	+	+
Srubnaya	[S16,S17]	+	+	+
Sweden_LNBA	[S28]	+	+	+
Sweden_TRB	[S28]	+	+	+
Tagar	[S21]	+	+	+
Trypillia	[S31]	+	+	+
Ukraine_Eneolithic	[S31]	+	+	+
Ukraine_Mesolithic	[S31,S32]	+	+	+
Ukraine_Neolithic	[S31,S32]	+	+	+
Ust-Ishim	[S16]			+
West_Siberia_N	[S17]	+	+	+
WHG	[S16,S31]	+	+	+
Wusun	[S21]	+	+	+
Yamnaya	[S26]	+	+	+
Yamnaya_Bulgaria	[S31]	+	+	+
Yamnaya_Kalmykia	[S16]	+	+	+
Yamnaya_Samara	[S16]	+	+	+
Yamnaya_Ukraine	[S31]	+	+	+
Zevakinskiy_LBA	[S17]	+	+	+

Xibo	[S18]	+	+
Yakuts	[S18,S27]	+	+
Yemenese	[S23]		+
Yorubas	[S18]	+	+
Yukaghirs	[S19]	+	+

Table S3. Modern and ancient comparison populations for principal component (PCA), outgroup f3 and D statistics' (f3, D), ADMIXTURE (ADM) and ChromoPainter (CP) analyses. Related to Figures 1, 2, 3, S1 and S2.

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