

# Supplementary 1

## HISTORICAL CONTEXT OF THE DMITRY ALEXANDROVICH BURIAL

The burial of Prince Dmitry Alexandrovich, the son of Alexander Yaroslavich Nevsky, was investigated by the architectural and archaeological team of the Institute of Archeology of the Russian Academy of Sciences under the leadership of V.I. Sedov. Dmitry Alexandrovich is a prominent figure in the political history of the second half of the XIII – the first quarter of the XIV century. Below is detailed historical evidence of this burial and archaeological materials underlying its attribution.

Prince Dmitry Alexandrovich (1250–1294), the second son of Prince Alexander Yaroslavich, who after the death of his father (1263) assumed his inheritance – the Principality of Pereyaslav. In different years prince Dmitry Alexandrovich occupied the Novgorod and the great Vladimir reigns. Being in the Novgorod principality, he participated in a campaign against Derpt (1262), in the Battle of Rakovor, the victory in which was largely ensured by the actions of his regiment (1268), undertook a campaign against the Karelians (1278), and built a stone fortress in Koporye (1280) that was soon destroyed by the Novgorodians. As the eldest in the family after the death of his uncle Vasily Yaroslavich, Dmitry Alexandrovich assumed the great throne in 1276 and from 1281, with varying degree of success, fought for the Vladimir with his younger brother Andrei Gorodetsky, and as the result was forced to finally relinquish the great reign in 1294. Dmitry Alexandrovich died on Volok Lamsky on his way to Pereslavl from Tver, and he was buried in Pereslavl (Complete collection of Russian chronicles, vol. 1, 282 p.; Complete collection of Russian chronicles, vol. 3, 328 p.). At the same time, a number of chronicles (including the 4th Novgorod chronicle, the Moscow chronicle of the late XV century, Voskresenskaya and Nikonovskaya chronicles) contain direct references to the fact that he was buried in the Transfiguration Cathedral of Pereyaslav-Zalessky (Complete collection of Russian chronicles, vol. 4, 249 p.; Complete collection of Russian chronicles, vol. 25, 157 p.; Complete collection of Russian chronicles, vol. 7, 181 p.; Complete collection of Russian chronicles, vol. 13, 170 p.).

The search for the burial place of Prince Dmitry Alexandrovich in the Transfiguration Cathedral is made easier by the fact that this temple was used as a prestigious tomb in the Middle Ages less often than many others. The chronicle preserved information about only two princely burials committed here:

except for Prince Dmitry Alexandrovich, his son Ivan, who died in 1302, was buried here. With the death of Ivan, who died childless, the Pereyaslav principality passed to Moscow. An indication of the location of the burial place of Dmitry and Ivan is given by the earliest description of the cathedral known to us (1702), “Documents on the finding of inscriptions in the cemeteries of monasteries and churches” of Pereyaslav 1792–1793, an engraved plan of the cathedral in the middle of the XIX century, and observations by academician V.V. Suslov, who supervised the restoration work in the cathedral in 1891. Based on these documents, it can be surmised that the burial of Ivan Dmitrievich took place in the southwestern part of the cathedral, under the choirs, and the burial of Prince Dmitry Alexandrovich was in the southeastern part, in the southern altar apse. Before the restoration of 1891, there were brick tombstones of the XVII century marking the places of burial here.

In 2014, in connection with the planned restoration work in the Transfiguration Cathedral and next to it, a series of pits were dug and a previously undocumented and closed with a wooden plug pit was opened in the southeast corner of the cathedral. In the pit, the remains of a white-stone sarcophagus were found in the form of a quadrangular box, slightly expanding to the west, shallow, with fragments of a broken lid. The sarcophagus was placed along the wall of the temple. The southwest corner (headboard), partially the southern wall, and, partially, the bottom of the sarcophagus have been preserved. The length of the sarcophagus is 165 cm, the width is 60 cm, the thickness of the side wall is 5 cm, and the height is 32 cm. Near the sarcophagus, in the filling, scattered human bones were found. A whole series of bones



**Fig. 1.** Remains from the destroyed sarcophagus of the Transfiguration Cathedral of Pereslavl. The first cervical vertebra, rear view. The different inclination of the surfaces marked with arrows is clearly visible

was found in the head of the sarcophagus, covered with earth. The shape of the sarcophagus is typical of the XIII–XIV centuries. The identification of the remains from the sarcophagus as the burial place of Prince Dmitry Alexandrovich is thus based on a combination of historical accounts about the burial, archaeological data, and anthropological principles.

The remains found in the context of the crypt are represented by several bones:

1. First cervical vertebra.
2. 3rd cervical vertebra.
3. Two vertebrae of the upper part of the thoracic spine.
4. One lower thoracic vertebra.
5. One lumbar vertebra.
6. First rib right.
7. Top rib left.
8. Bones of the right hand: metacarpal bone of the first ray, metacarpal bone of the third ray, hyoid bone.
9. Bones of the left hand: metacarpal bone of the first ray. Metacarpal IV ray, proximal phalanges III and IV ray.
10. Bones of the left foot: proximal phalanx of the 1st ray of the left foot.
11. Bones of the right foot: sphenoid bone.

The preservation of the bone tissue is good, which is typical for a bone that was out of contact with the ground for a long time after burial and suggests a rather late episode of the destruction of the sarcophagus.

The condition of the articular surfaces of the small joints of the hand and foot denotes the presence of osteophytes and arthrosis on the vertebrae of the cervical and thoracic regions. A significant functional relief on the bones of the hand, the presence of a local spot of “polishing” on the first cervical vertebra, allow us to believe the age of a person as mature. The lack of a complete skeleton makes it difficult to determine the exact age. It is reasonable to use a wide age range: 35–49 years. The dimensions of the bones of the hand allow us to consider that the remains belonged to a man. An asymmetry of the inclination of the right or left upper and lower articular fossae of the first vertebra (atlas) was noted, which suggests that the head position slightly retracted to the left side was typical for the individual.



**Fig. 2.** Remains from the destroyed sarcophagus of the Transfiguration Cathedral in Pereslavl. Deformation of the articulated surfaces of the third cervical vertebra



**Fig. 3.** Remains from the destroyed sarcophagus of the Transfiguration Cathedral of Pereslavl. Osteophyte on a fragment of the body of the thoracic vertebra

# Supplementary 2

Table 1. List of samples for PCA analysis

Sample	Pop	Sample	Pop	Sample	Pop
VK296.SG	Denmark_EarlyViking	VK221.SG	Russia_Viking	VK542.SG	Ukraine_Medieval
VK297.SG	Denmark_EarlyViking	VK158.SG	Russia_Viking	VK539.SG	Ukraine_Viking
VK301.SG	Denmark_Viking	VK159.SG	Russia_Viking	VK540.SG	Ukraine_Viking
VK329.SG	Denmark_Viking	VK410.SG	Russia_Viking	KAR-005	Karelian
VK319.SG	Denmark_Viking	VK413.SG	Russia_Viking_o	KAR-008	Karelian
NEV2_3	Rurik_DmitriyAleksander	VK466.SG	Russia_Viking_o	KAR-009	Karelian
VK143.SG	England_Viking	VK18.SG	Russia_Viking_o	KAR-030	Karelian
VK144.SG	England_Viking	VK21.SG	Russia_Viking_o	KAR-034	Karelian
VK264.SG	England_Viking	VK160.SG	Russia_Viking_o	KAR-046	Karelian
VK485.SG	Estonia_EarlyViking	Rbgp-200	Russian	KAR-092	Karelian
VK506.SG	Estonia_EarlyViking	Rbgp-201	Russian	KAR-105	Karelian
VK490.SG	Estonia_EarlyViking	Rbgp-203	Russian	KAR-110	Karelian
JK1963	Finland_Levanluhta	Rbgp-205	Russian	KAR-111	Karelian
JK1968	Finland_Levanluhta	Rkbo-12	Russian	KAR-131	Karelian
JK1970	Finland_Levanluhta	Rkbo-16	Russian	KAR-157	Karelian
Gagarin	Rurik_Modern	HGDP00898	Russian	KAR-165	Karelian
VK545.SG	Ireland_Viking	HGDP00899	Russian	KAR-167	Karelian
VK543.SG	Ireland_Viking	HGDP00900	Russian	KAR-173	Karelian
VK544.SG	Ireland_Viking	HGDP00901	Russian	MOL-005	Moldavian
DA207.SG	Kazakhstan_His	HGDP00902	Russian	MOL-008	Moldavian
DA208.SG	Kazakhstan_His	HGDP00903	Russian	MOL-015	Moldavian
DA94.SG	Kazakhstan_Medieval_Nomad	HGDP00886.SDG	Russian	MOL-024	Moldavian
DA126.SG	Kazakhstan_Medieval_Nomad	HGDP00885.SDG	Russian	MOL-058	Moldavian
DA228.SG	Kazakhstan_Turk	Rakr-203	Russian_Archangelsk_Krasnoborsky	MOL-064	Moldavian
DA89.SG	Kazakhstan_Turk	Rakr-205	Russian_Archangelsk_Krasnoborsky	MOL-065	Moldavian
Khilkov	Rurik_Modern	Rakr-237	Russian_Archangelsk_Krasnoborsky	MOL-066	Moldavian
Kropotkin	Rurik_Modern	Rakr-248	Russian_Archangelsk_Krasnoborsky	MOL-067	Moldavian
DA117.SG	Kyrgyzstan_Modern_Nomad	Rakr-341	Russian_Archangelsk_Krasnoborsky	MOL-069	Moldavian
DA69.SG	Kyrgyzstan_TianShan_Hun	Rakr-345	Russian_Archangelsk_Krasnoborsky	STA-003	Tatar_Siberian
DA65.SG	Kyrgyzstan_TianShan_Hun	Rakr1sh-002	Russian_Archangelsk_Leshukonsky	STA-004	Tatar_Siberian
DA74.SG	Kyrgyzstan_TianShan_Hun	Rakr1sh-140	Russian_Archangelsk_Leshukonsky	STA-006	Tatar_Siberian
DA52.SG	Kyrgyzstan_TianShan_Hun	Rakr1sh-143	Russian_Archangelsk_Leshukonsky	STA-112	Tatar_Siberian
DA385.SG	Kyrgyzstan_TianShan_Hun	Rakr1sh-144	Russian_Archangelsk_Leshukonsky	STA-116	Tatar_Siberian
DA66.SG	Kyrgyzstan_TianShan_Hun	Rakr1sh-149	Russian_Archangelsk_Leshukonsky	STA-120	Tatar_Siberian
DA68.SG	Kyrgyzstan_TianShan_Hun	RPin-114	Russian_Archangelsk_Pinezhsky	STA-122	Tatar_Siberian
Lobanov-Rostovski	Rurik_Modern	RPin-123	Russian_Archangelsk_Pinezhsky	STA-126	Tatar_Siberian
VK419.SG	Norway_Viking	RPin-143	Russian_Archangelsk_Pinezhsky	STA-128	Tatar_Siberian
VK514.SG	Norway_Viking	RPin-145	Russian_Archangelsk_Pinezhsky	STA-129	Tatar_Siberian
VK414.SG	Norway_Viking	RPin-151	Russian_Archangelsk_Pinezhsky	STA-205	Tatar_Siberian
VK200.SG	Poland_Viking	VK208.SG	Scotland_Viking	STA-211	Tatar_Siberian
VK153.SG	Poland_Viking	VK202.SG	Scotland_Viking	STA-212	Tatar_Siberian
VK494.SG	Poland_Viking	VK204.SG	Scotland_Viking	STA-237	Tatar_Siberian
abh107	Russia_Abkhasian	Shakhovskii	Rurik_Modern	STA-265	Tatar_Siberian
S_Abkhasian-2.DG	Russia_Abkhasian	VK379.SG	Sweden_EarlyViking	STA-297	Tatar_Siberian
DA160.SG	Russia_Alana	VK382.SG	Sweden_EarlyViking	STA-300	Tatar_Siberian
DA162.SG	Russia_Alana	VK350.SG	Sweden_Viking	STA-304	Tatar_Siberian
DA243.SG	Russia_Alana	VK349.SG	Sweden_Viking	STA-306	Tatar_Siberian
DA164.SG	Russia_Alana	VK355.SG	Sweden_Viking	STA-309	Tatar_Siberian
CHV001.A0101	Russia_Chalmny_Varre	VK541.SG	Ukraine_Medieval	STA-357	Tatar_Siberian_Zabolotniye
CHV002.A0101	Russia_Chalmny_Varre			STA-362	Tatar_Siberian_Zabolotniye
DA142.SG	Russia_Medieval_Nomad			STA-366	Tatar_Siberian_Zabolotniye
NorthOssetia12	Russia_NorthOssetian			STA-434	Tatar_Siberian_Zabolotniye
NorthOssetia5	Russia_NorthOssetian			STA-435	Tatar_Siberian_Zabolotniye
DA190.SG	Russia_SaltovoMayaki			TTR-086	Tatar_Kazan
DA189.SG	Russia_SaltovoMayaki			TTR-094	Tatar_Kazan
DA188.SG	Russia_SaltovoMayaki			TTR-097	Tatar_Kazan
Sunghir6.SG	Russia_Sunghir_Medieval			TTR-201	Tatar_Kazan
				TTR-217	Tatar_Kazan

## RESEARCH ARTICLES

Sample	Pop
TTR-241	Tatar_Mishar
TTR-244	Tatar_Kazan
TTR-245	Tatar_Kazan
TTR-249	Tatar_Kazan
TTR-250	Tatar_Kazan
TTR-271	Tatar_Mishar
TTR-272	Tatar_Mishar
TTR-330	Tatar_Kazan
TTR-356	Tatar_Mishar
TTR-359	Tatar_Mishar
TTR-362	Tatar_Mishar
TTR-436	Tatar_Mishar
TTR-460	Tatar_Mishar
TTR-462	Tatar_Mishar
TTR-464	Tatar_Mishar
TTR-493	Tatar_Kazan
TTR-501	Tatar_Kazan
TTR-514	Tatar_Kazan
BAS-005	Bashkir
BAS-006	Bashkir
BAS-008	Bashkir
BAS-014	Bashkir
BAS-017	Bashkir
BAS-021	Bashkir
BAS-029	Bashkir
BAS-031	Bashkir
BAS-033	Bashkir
BAS-034	Bashkir
BAS-042	Bashkir
BAS-045	Bashkir
BAS-046	Bashkir
BAS-060	Bashkir
BAS-062	Bashkir
BAS-091	Bashkir
BAS-094	Bashkir
BAS-096	Bashkir
BAS-105	Bashkir
BAS-111	Bashkir
BAS-120	Bashkir
BAS-121	Bashkir
BAS-125	Bashkir
BAS-135	Bashkir
BAS-150	Bashkir
BAS-153	Bashkir
BAS-156	Bashkir
BAS-164	Bashkir
BAS-600	Bashkir
BAS-622	Bashkir
BAS-652	Bashkir
BAS-655	Bashkir
BAS-661	Bashkir
BAS-663	Bashkir
BAS-669	Bashkir
BAS-670	Bashkir
BAS-671	Bashkir
BAS-672	Bashkir
BAS-683	Bashkir
BAS-811	Bashkir
BAS-813	Bashkir
BAS-822	Bashkir
BAS-825	Bashkir
BAS-831	Bashkir
BAS-833	Bashkir
BAS-834	Bashkir
BAS-849	Bashkir
BAS-1392	Bashkir

Sample	Pop
BAS-1393	Bashkir
BAS-1394	Bashkir
BAS-1396	Bashkir
BAS-1398	Bashkir
BAS-1400	Bashkir
MOE-001	Mordovian
MOE-002	Mordovian
MOE-010	Mordovian
MOE-014	Mordovian
MOE-015	Mordovian
MOE-020	Mordovian
MOE-025	Mordovian
MOE-036	Mordovian
MOE-043	Mordovian
MOE-045	Mordovian
MOE-433	Mordovian
MOE-445	Mordovian
MOE-450	Mordovian
MOE-451	Mordovian
MOE-452	Mordovian
MOE-455	Mordovian
MOE-475	Mordovian
MOE-485	Mordovian
MOE-491	Mordovian
MOE-492	Mordovian
MOE-495	Mordovian
MOE-497	Mordovian
Ttr-473	Chuvash
Ttr-474	Chuvash
Ttr-481	Chuvash
Ttr-507	Chuvash
Ttr-568	Chuvash
Ttr-569	Chuvash
UKR-1283	Ukrainian
UKR-1291	Ukrainian
UKR-1292	Ukrainian
UKR-1377	Ukrainian
UKR-1399	Ukrainian_North
UKR-1903	Ukrainian_North
UKR-1909	Ukrainian_North
UKR-1913	Ukrainian_North
UKR-1951	Ukrainian_North
UKR-1978	Ukrainian_North
UKR-1992	Ukrainian_North
UKR-2021	Ukrainian_North
bel43s	Belarusian
bel30s	Belarusian
bel72c	Belarusian
bel93c	Belarusian
bel110c	Belarusian
bel8s	Belarusian
belarusian23vp	Belarusian
bel23s	Belarusian
belarusian47zp	Belarusian
bel82s	Belarusian
ch126	Chechen
ch16	Chechen
ch174	Chechen
ch179	Chechen
ch193	Chechen
ch21	Chechen
ch3	Chechen
ch113	Chechen
ch31	Chechen
Adg-185	Adygei
Adg-192	Adygei

Sample	Pop
Adg-194	Adygei
Adg-222	Adygei
Adg-224	Adygei
Adg-226	Adygei
Adg-227	Adygei
Adg-238	Adygei
lpgh-303	Adygei
Shap-55	Adygei
Shap-156	Adygei
Shap-225	Adygei
YY-2	Adygei
YY-18	Adygei
YY-36	Adygei
Kab-5	Kabardinian
Kab-10	Kabardinian
Kab-13	Kabardinian
Kab-16	Kabardinian
Kab-18	Kabardinian
Kab-24	Kabardinian
Kab-26	Kabardinian
Kab-30	Kabardinian
LPGH-139	Kabardinian
ABA-035	Karachai
ABA-048	Karachai
ABA-052	Karachai
ABA-056	Karachai
ABA-065	Karachai
ABA-069	Karachai
ABA-078	Karachai
ABA-085	Karachai
ABA-086	Karachai
ABA-091	Karachai
ABA-099	Karachai
ABA-100	Karachai
nogay42	Nogai_Karachay_Cherkessia
nogay35	Nogai_Karachay_Cherkessia
nogay34	Nogai_Karachay_Cherkessia
nogay24	Nogai_Karachay_Cherkessia
nogay25	Nogai_Karachay_Cherkessia
nogay33	Nogai_Karachay_Cherkessia
nogay44	Nogai_Karachay_Cherkessia
nogay45	Nogai_Karachay_Cherkessia
nogay46	Nogai_Karachay_Cherkessia
abh27	Abkhasian
abh107	Abkhasian
abh41	Abkhasian
abh119	Abkhasian
abh122	Abkhasian
abh133	Abkhasian
abh147	Abkhasian
abh154	Abkhasian
abh24	Abkhasian
UDM-004	Udmurt
UDM-033	Udmurt
UDM-034	Udmurt
UDM-138	Udmurt
UDM-229	Udmurt
UDM-254	Udmurt
UDM-255	Udmurt
UDM-256	Udmurt
UDM-318	Udmurt
UDM-335	Udmurt
UZB-229	Uzbek
UZB-232	Uzbek
UZB-234	Uzbek
UZB-235	Uzbek



RESEARCH ARTICLES

Sample	Pop
UZB-236	Uzbek
UZB-237	Uzbek
UZB-238	Uzbek
UZB-244	Uzbek
UZB-246	Uzbek
UZB-301	Uzbek
UZB-302	Uzbek
UZB-303	Uzbek
UZB-304	Uzbek
UZB-305	Uzbek
UZB-306	Uzbek
UZB-307	Uzbek
UZB-308	Uzbek
Tuebingen76	Ket
Tuebingen80	Ket
Tuebingen81	Ket
Tuebingen83	Ket
Tuebingen82	Ket
Tuebingen87	Ket
Tuebingen90	Ket
Tuebingen94	Ket
Tuebingen95	Ket
Tuebingen97	Ket
Tuebingen101	Ket
Tuebingen103	Ket
Tuebingen104	Ket
TuebingenK7	Ket
TuebingenK15	Ket
TuebingenK16	Ket
TuebingenK17	Ket
TuebingenK22	Ket
TuebingenK29	Ket
TUV-004	Tuvinian
TUV-008	Tuvinian
TUV-024	Tuvinian
TUV-044	Tuvinian
TUV-059	Tuvinian
TUV-062	Tuvinian
TUV-071	Tuvinian
TUV-096	Tuvinian
TUV-349	Tuvinian
TUV-392	Tuvinian
BUR-003	Buryat
BUR-008	Buryat
BUR-009	Buryat
BUR-042	Buryat
BUR-047	Buryat
BUR-050	Buryat
BUR-051	Buryat
BUR-074	Buryat
BUR-087	Buryat
BUR-124	Buryat
BUR-144	Buryat
BUR-158	Buryat
BUR-160	Buryat
BUR-205	Buryat
BUR-207	Buryat
BUR-215	Buryat
BUR-217	Buryat
BUR-224	Buryat
BUR-255	Buryat
BUR-258	Buryat
BUR-358	Buryat
BUR-382	Buryat
BUR-415	Buryat
BUR-531	Buryat

Sample	Pop
BUR-562	Buryat
BUR-568	Buryat
BUR-578	Buryat
BUR-587	Buryat
BUR-594	Buryat
BUR-599	Buryat
BUR-605	Buryat
BUR-635	Buryat
BUR-645	Buryat
BUR-684	Buryat
BUR-694	Buryat
BUR-706	Buryat
BUR-707	Buryat
HGDP00945	Yakut
HGDP00946	Yakut
HGDP00947	Yakut
HGDP00948	Yakut
HGDP00950	Yakut
HGDP00951	Yakut
HGDP00952	Yakut
HGDP00954	Yakut
HGDP00955	Yakut
HGDP00956	Yakut
HGDP00958	Yakut
HGDP00960	Yakut
HGDP00961	Yakut
HGDP00962	Yakut
HGDP00963	Yakut
HGDP00964	Yakut
HGDP00965	Yakut
HGDP00966	Yakut
HGDP00967	Yakut
HGDP00968	Yakut
ADR00514	Nganasan
ADR00513	Nganasan
ADR00509	Nganasan
ADR00512	Nganasan
ADR00504	Nganasan
ADR00507	Nganasan
ADR00511	Nganasan
ADR00510	Nganasan
ADR00508	Nganasan
ADR00515	Nganasan
Tuebingen06	Nganasan
Tuebingen07	Nganasan
Tuebingen12	Nganasan
Tuebingen14	Nganasan
Tuebingen17	Nganasan
Tuebingen19	Nganasan
Tuebingen21	Nganasan
Tuebingen23	Nganasan
Tuebingen25	Nganasan
Tuebingen27	Nganasan
Tuebingen28	Nganasan
Tuebingen106	Nganasan
Tuebingen111	Nganasan
Tuebingen112	Nganasan
Tuebingen114	Nganasan
Tuebingen116	Nganasan
Tuebingen119	Nganasan
Tuebingen121	Nganasan
Tuebingen123	Nganasan
Tuebingen124	Nganasan
Tuebingen126	Nganasan
Tuebingen127	Nganasan
ALT-741	Altaiian

Sample	Pop
ALT-743	Altaiian
ALT-744	Altaiian
ALT-746	Altaiian
ALT-753	Altaiian
ALT-756	Altaiian
ALT-760	Altaiian
ALT-771	Altaiian
ALT-774	Altaiian
ALT-775	Altaiian
ALT-776	Altaiian
ALT-875	Altaiian
ALT-876	Altaiian
ALT-900	Altaiian
ALT-916	Altaiian
ALT-918	Altaiian
ALT-935	Altaiian
altai363p	Altaiian
altai380k	Altaiian
altai280p	Altaiian
altai431k	Altaiian
altai283p	Altaiian
altai419A	Altaiian
altai409k	Altaiian
JK2065	Finland_Levanluhta_B
I18743	Hungary_DanubeTisza_EAvar
A1801	Hungary_DanubeTisza_EAvar
A1802	Hungary_DanubeTisza_EAvar
A1808	Hungary_DanubeTisza_EAvar
A1816	Hungary_DanubeTisza_EAvar
A1818	Hungary_DanubeTisza_EAvar
A1819	Hungary_DanubeTisza_EAvar
A1820	Hungary_DanubeTisza_EAvar
A1821	Hungary_DanubeTisza_EAvar
A1822	Hungary_DanubeTisza_EAvar
A1823	Hungary_DanubeTisza_EAvar
I18222	Hungary_DanubeTisza_LAvar
I18225	Hungary_DanubeTisza_LAvar
A1809	Hungary_DanubeTisza_LAvar
A1810	Hungary_DanubeTisza_LAvar
A1813	Hungary_DanubeTisza_LAvar
A1814	Hungary_DanubeTisza_LAvar
A1815	Hungary_DanubeTisza_LAvar
SZF-43.SG	Hungary_EarlyAvar
SZK-102.SG	Hungary_EarlyAvar
SZOD1-127.SG	Hungary_EarlyAvar
SSD-17.SG	Hungary_EarlyAvar
SZK-213.SG	Hungary_EarlyAvar
SSD-58.SG	Hungary_EarlyAvar
KFP-31.SG	Hungary_EarlyAvar
MM-83.SG	Hungary_EarlyAvar
MS-43.SG	Hungary_EarlyAvar
SZOD1-187.SG	Hungary_EarlyAvar
SZOD1-554.SG	Hungary_EarlyAvar
SZF-181.SG	Hungary_EarlyAvar
MM-131.SG	Hungary_EarlyAvar
MM-151.SG	Hungary_EarlyAvar
AN-286.SG	Hungary_EarlyAvar
AN-376.SG	Hungary_EarlyAvar
FU-215.SG	Hungary_EarlyAvar
HC-168.SG	Hungary_EarlyAvar
CSPF-114.SG	Hungary_EarlyAvar
ACG-19.SG	Hungary_EarlyAvar
SZOD1-76.SG	Hungary_EarlyAvar
SZOD1-829.SG	Hungary_EarlyAvar
MM-240.SG	Hungary_EarlyAvar
MM-245.SG	Hungary_EarlyAvar

## RESEARCH ARTICLES

Sample	Pop
FU-193.SG	Hungary_EarlyAvar
MT-29.SG	Hungary_EarlyAvar
KFP-30a.SG	Hungary_EarlyAvar
MS-45.SG	Hungary_EarlyAvar
CSB-9.SG	Hungary_EarlyAvar
SZRV-54.SG	Hungary_EarlyAvar
SZF-26.SG	Hungary_EarlyAvar
SZF-371.SG	Hungary_EarlyAvar
MM-61.SG	Hungary_EarlyAvar
MM-80.SG	Hungary_EarlyAvar
TMH-509.SG	Hungary_LateAvar
TMH-1273.SG	Hungary_LateAvar
CSPF-213.SG	Hungary_LateAvar
ARK-6.SG	Hungary_LateAvar
JHT-130.SG	Hungary_LateAvar
OBT-56.SG	Hungary_LateAvar
ARK-38.SG	Hungary_LateAvar
OBT-3.SG	Hungary_LateAvar
OBT-51.SG	Hungary_LateAvar
ARK-43.SG	Hungary_LateAvar
ARK-48.SG	Hungary_LateAvar
SZKT-265.SG	Hungary_LateAvar
SZKT-311.SG	Hungary_LateAvar
VPB-31.SG	Hungary_LateAvar
SZRV-212.SG	Hungary_LateAvar
SZRV-266.SG	Hungary_LateAvar
SZKT-62.SG	Hungary_LateAvar
SZKT-70.SG	Hungary_LateAvar
ARK-29.SG	Hungary_LateAvar
ARK-36.SG	Hungary_LateAvar
TMH-798.SG	Hungary_LateAvar
TTSZ-43.SG	Hungary_LateAvar
ALT-414.SG	Hungary_LateAvar
TMH-199.SG	Hungary_LateAvar
OBH-37.SG	Hungary_LateAvar
OBH-52.SG	Hungary_LateAvar
PV-205.SG	Hungary_LateAvar
JHT-30.SG	Hungary_LateAvar
HH-10.SG	Hungary_LateAvar
HH-22.SG	Hungary_LateAvar
OBT-106.SG	Hungary_LateAvar
OBT-108.SG	Hungary_LateAvar
SZKT-89.SG	Hungary_LateAvar
ALT-369.SG	Hungary_LateAvar
ALT-412.SG	Hungary_LateAvar
KK2-441.SG	Hungary_LateAvar
KK1-251.SG	Hungary_LateAvar
KK1-252.SG	Hungary_LateAvar
ARK-16.SG	Hungary_LateAvar
ARK-17.SG	Hungary_LateAvar
PV-200.SG	Hungary_LateAvar
KK1-368.SG	Hungary_LateAvar
KK1-541.SG	Hungary_LateAvar
PV-12.SG	Hungary_LateAvar
SZRV-277.SG	Hungary_LateAvar
SZRV-316.SG	Hungary_LateAvar
ARK-11.SG	Hungary_LateAvar
ARK-14.SG	Hungary_LateAvar
ARK-49.SG	Hungary_LateAvar
ARK-50.SG	Hungary_LateAvar
SZRV-67.SG	Hungary_LateAvar

Sample	Pop
SZM-332.SG	Hungary_LateAvar
SZK-130.SG	Hungary_LateAvar
ARK-21.SG	Hungary_LateAvar
ARK-24.SG	Hungary_LateAvar
ALT-596.SG	Hungary_LateAvar
SZRV-168.SG	Hungary_LateAvar
KK2-445.SG	Hungary_LateAvar
KK2-670.SG	Hungary_LateAvar
ARK-19.SG	Hungary_LateAvar
ARK-20.SG	Hungary_LateAvar
I16744	Hungary_Transtisza_EAvar
I16812	Hungary_Transtisza_EAvar
I20800	Hungary_Transtisza_EAvar
I20801	Hungary_Transtisza_EAvar
A1804	Hungary_Transtisza_EAvar
A1805	Hungary_Transtisza_EAvar
A1806	Hungary_Transtisza_EAvar
A1807	Hungary_Transtisza_EAvar
I16743	Hungary_Transtisza_LAvar
I16741	Hungary_Transtisza_LAvar
I20798	Hungary_Transtisza_LAvar
I20799	Hungary_Transtisza_LAvar
BOT14.SG	Kazakhstan_Botai_Eneolithic
BOT2016.SG	Kazakhstan_Botai_Eneolithic
BOT2016	Kazakhstan_Botai_Eneolithic
BOT14	Kazakhstan_Botai_Eneolithic
DA47.SG	Kyrgyzstan_TianShan_Saka
DA48.SG	Kyrgyzstan_TianShan_Saka
DA49.SG	Kyrgyzstan_TianShan_Saka
DA50.SG	Kyrgyzstan_TianShan_Saka
DA51.SG	Kyrgyzstan_TianShan_Saka
DA55.SG	Kyrgyzstan_TianShan_Saka
DA57.SG	Kyrgyzstan_TianShan_Saka
DA58.SG	Kyrgyzstan_TianShan_Saka
RISE515.SG	Russia_BA_Okunevo
RISE667.SG	Russia_BA_Okunevo
RISE670.SG	Russia_BA_Okunevo
RISE671.SG	Russia_BA_Okunevo
RISE672.SG	Russia_BA_Okunevo
RISE674.SG	Russia_BA_Okunevo
RISE675.SG	Russia_BA_Okunevo
RISE677.SG	Russia_BA_Okunevo
RISE680.SG	Russia_BA_Okunevo
RISE681.SG	Russia_BA_Okunevo
RISE683.SG	Russia_BA_Okunevo
RISE684.SG	Russia_BA_Okunevo
RISE685.SG	Russia_BA_Okunevo
RISE719.SG	Russia_BA_Okunevo
BOO001.A0101	Russia_Bolshoy
BOO002.A0101	Russia_Bolshoy
BOO003.A0101	Russia_Bolshoy
BOO004.A0101	Russia_Bolshoy
BOO005.A0101	Russia_Bolshoy
BOO006.A0101	Russia_Bolshoy
RISE504.SG	Russia_IA_2
RISE600.SG	Russia_IA_3
RISE601.SG	Russia_IA_3
RISE602.SG	Russia_IA_3
I0574	Russia_IA_EarlySarmatian
I0575	Russia_IA_EarlySarmatian
s19_VII15_1.SG	Russia_IA_Ingria

Sample	Pop
s19_VIII5_2.SG	Russia_IA_Ingria
s19_VIII7_1.SG	Russia_IA_Ingria
s19_VIII8_1.SG	Russia_IA_Ingria
s19_VIII9_1.SG	Russia_IA_Ingria
chy001.SG	Russia_Late_Sarmatian
chy002.SG	Russia_Late_Sarmatian
tem001.SG	Russia_Late_Sarmatian
tem002.SG	Russia_Late_Sarmatian
tem003.SG	Russia_Late_Sarmatian
RISE553.SG	Russia_LBA
RISE554.SG	Russia_LBA
I6047	Russia_LBA_Priobrazhenka
DA340.SG	Russia_Lokomotiv_Eneolithic
DA341.SG	Russia_Lokomotiv_Eneolithic
DA357.SG	Russia_Lokomotiv_Eneolithic
DA359.SG	Russia_Lokomotiv_Eneolithic
RISE523.SG	Russia_Mezhovskaya
RISE524.SG	Russia_Mezhovskaya
RISE525.SG	Russia_Mezhovskaya
I0418	Russia_Potapovka
I0246	Russia_Potapovka
DA134.SG	Russia_Sarmatian
DA139.SG	Russia_Sarmatian
DA141.SG	Russia_Sarmatian
DA143.SG	Russia_Sarmatian
DA144.SG	Russia_Sarmatian
DA145.SG	Russia_Sarmatian
DA136.SG	Russia_Sarmatian
MJ-38.SG	Russia_Sarmatian
DA245.SG	Russia_Shamanka_Eneolithic
DA246.SG	Russia_Shamanka_Eneolithic
DA247.SG	Russia_Shamanka_Eneolithic
DA248.SG	Russia_Shamanka_Eneolithic
DA249.SG	Russia_Shamanka_Eneolithic
DA250.SG	Russia_Shamanka_Eneolithic
DA251.SG	Russia_Shamanka_Eneolithic
DA252.SG	Russia_Shamanka_Eneolithic
DA253.SG	Russia_Shamanka_Eneolithic
DA362.SG	Russia_Shamanka_Eneolithic
AY2003	Russia_Steppe_Maikop
SA6001	Russia_Steppe_Maikop
SA6004	Russia_Steppe_Maikop
DA2.SG	Russia_Tagar
DA3.SG	Russia_Tagar
DA4.SG	Russia_Tagar
DA5.SG	Russia_Tagar
DA6.SG	Russia_Tagar
DA7.SG	Russia_Tagar
DA8.SG	Russia_Tagar
DA9.SG	Russia_Tagar
SHE001	Shekshovo9
SHE002	Shekshovo9
SHE003	Shekshovo9
SHE004	Shekshovo9
SHE005	Shekshovo9
SHE006	Shekshovo9
SHE007	Shekshovo9
SHE008	Shekshovo9
SHE009	Shekshovo9

Table 2. List of samples displayed on simplified PCA

Sample	Pop	Sample	Pop	Sample	Pop
VK296.SG	Denmark_EarlyViking	DA190.SG	Russia_SaltovoMayaki	SHE008	Shekshovo9
VK325.SG	Denmark_Viking	DA189.SG	Russia_SaltovoMayaki	SHE009	Shekshovo9
NEV2_3	Rurik_DmitriyAleksander	Sunghir6.SG	Russia_Sunghir_Medieval	chy001.SG	Russia_Late_Sarmatian
VK143.SG	England_Viking	VK14.SG	Russia_Viking	chy002.SG	Russia_Late_Sarmatian
VK257.SG	England_Viking	VK15.SG	Russia_Viking	tem001.SG	Russia_Late_Sarmatian
VK485.SG	Estonia_EarlyViking	VK223.SG	Russia_Viking	tem002.SG	Russia_Late_Sarmatian
VK506.SG	Estonia_EarlyViking	VK224.SG	Russia_Viking	tem003.SG	Russia_Late_Sarmatian
JK1963	Finland_Levanluhta	Rbgbp-200	Russian	DA2.SG	Russia_Tagar
JK1968	Finland_Levanluhta	Rbgbp-201	Russian	DA3.SG	Russia_Tagar
JK1970	Finland_Levanluhta	Rakr-203	Russian_Archangelsk_Krasnoborsky	DA4.SG	Russia_Tagar
Gagarin	Rurik_Modern	Rakr-205	Russian_Archangelsk_Krasnoborsky	DA5.SG	Russia_Tagar
Mysh	Rurik_Modern	VK208.SG	Scotland_Viking	DA6.SG	Russia_Tagar
VK545.SG	Ireland_Viking	VK207.SG	Scotland_Viking	DA7.SG	Russia_Tagar
VK543.SG	Ireland_Viking	Shakhovski	Rurik_Modern	DA8.SG	Russia_Tagar
DA207.SG	Kazakhstan_His	VK382.SG	Sweden_EarlyViking	DA9.SG	Russia_Tagar
DA208.SG	Kazakhstan_His	vik_urm161.SG	Sweden_Viking	AY2003	Russia_Steppe_Maikop
DA94.SG	Kazakhstan_Medieval_Nomad	VK541.SG	Ukraine_Medieval	SA6001	Russia_Steppe_Maikop
DA126.SG	Kazakhstan_Medieval_Nomad	VK542.SG	Ukraine_Medieval	SA6004	Russia_Steppe_Maikop
DA228.SG	Kazakhstan_Turk	VK539.SG	Ukraine_Viking	RISE553.SG	Russia_LBA
DA89.SG	Kazakhstan_Turk	VK540.SG	Ukraine_Viking	DA142.SG	Russia_Medieval_Nomad
Khilkov	Rurik_Modern	abh107	Abkhasian	DA117.SG	Kyrgyzstan_Modern_Nomad
Kropotkin	Rurik_Modern	PV-12.SG	Hungary_LateAvar	DA69.SG	Kyrgyzstan_TianShan_Hun
DA117.SG	Kyrgyzstan_Modern_Nomad	SZRV-277.SG	Hungary_LateAvar	DA65.SG	Kyrgyzstan_TianShan_Hun
DA66.SG	Kyrgyzstan_TianShan_Hun	SZRV-316.SG	Hungary_LateAvar	DA74.SG	Kyrgyzstan_TianShan_Hun
DA68.SG	Kyrgyzstan_TianShan_Hun	ARK-11.SG	Hungary_LateAvar	DA52.SG	Kyrgyzstan_TianShan_Hun
Lobanov-Rostovski	Rurik_Modern	ARK-14.SG	Hungary_LateAvar	DA385.SG	Kyrgyzstan_TianShan_Hun
VK419.SG	Norway_Viking	MS-45.SG	Hungary_EarlyAvar	DA66.SG	Kyrgyzstan_TianShan_Hun
VK414.SG	Norway_Viking	SZF-26.SG	Hungary_EarlyAvar	DA68.SG	Kyrgyzstan_TianShan_Hun
VK200.SG	Poland_Viking	SZF-371.SG	Hungary_EarlyAvar	DA47.SG	Kyrgyzstan_TianShan_Saka
VK155.SG	Poland_Viking	MM-61.SG	Hungary_EarlyAvar	DA48.SG	Kyrgyzstan_TianShan_Saka
abh107	Russia_Abkhasian	DA29.SG	Kazakhstan_GoldenHordeEuro	DA49.SG	Kyrgyzstan_TianShan_Saka
S_Abkhasian-2.DG	Russia_Abkhasian	SHE001	Shekshovo9	DA50.SG	Kyrgyzstan_TianShan_Saka
DA161.SG	Russia_Alan	SHE002	Shekshovo9	DA51.SG	Kyrgyzstan_TianShan_Saka
DA164.SG	Russia_Alan	SHE003	Shekshovo9	DA55.SG	Kyrgyzstan_TianShan_Saka
CHV001.A0101	Russia_Chalmny_Varre	SHE004	Shekshovo9	DA57.SG	Kyrgyzstan_TianShan_Saka
CHV002.A0101	Russia_Chalmny_Varre	SHE005	Shekshovo9	DA58.SG	Kyrgyzstan_TianShan_Saka
DA142.SG	Russia_Medieval_Nomad	SHE006	Shekshovo9	RISE600.SG	Russia_IA_3
NorthOssetia12	Russia_NorthOssetian	SHE007	Shekshovo9	RISE601.SG	Russia_IA_3
NorthOssetia5	Russia_NorthOssetian			RISE602.SG	Russia_IA_3

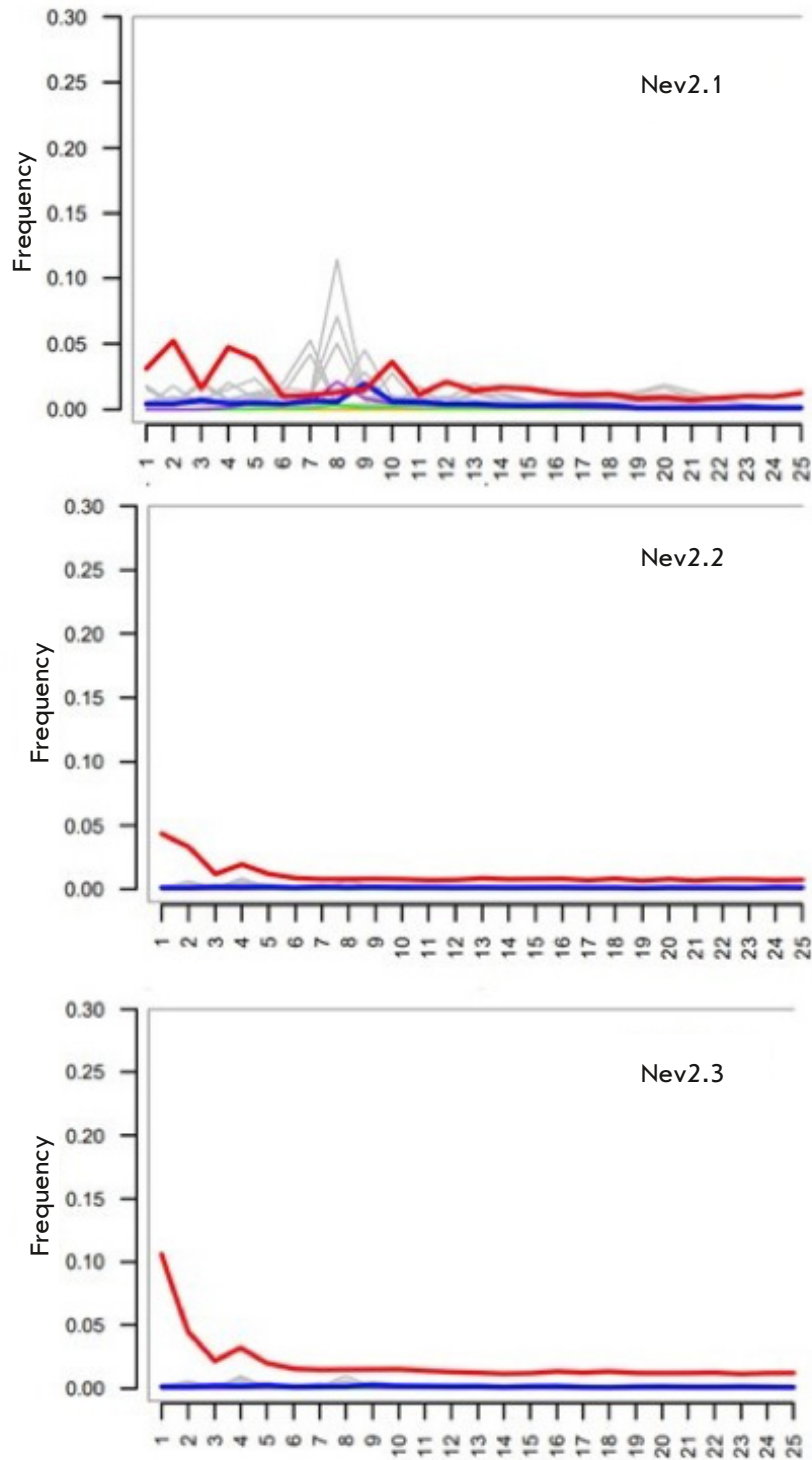
# Supplementary 3

**Table.** Results of test sequencing of aDNA fragment libraries

ID of the library	Original number of reads	Number of reads after filtering	Number of reads mapped on hg19	After removal of PCR duplicates	Endogenous DNA, %
Nev2.1	3301880	2513126	98603	46149	1.84
Nev2.2	4447600	3978101	655440	618891	15.56
Nev2.3	3774011	3213975	515504	470264	14.63



## Supplementary 4



Frequency of C to T substitutions at the 5' ends of aDNA fragments for the NEV2.1, NEV2.2, and NEV2.3 samples

# Supplementary 5

## RESULT OF ASSESSING THE CONTAMINATION OF THE SAMPLE ACCORDING TO SUCH PARAMETERS AS THE DEGREE OF HETEROZYGOSITY OF mtDNA AND X-CHROMOSOME

**Table 1.** Result of assessing the contamination of the sample according to such parameters as the degree of heterozygosity of the X-chromosome with mathematical methods "MoM" (Methods of Moments) and "ML" (Maximum Likelihood) (Mathieson, 2015)

Library ID	Number of SNP	MoM	SE (MoM)	ML	SE (ML)
NEV_2.3	3957	1,13%	1,75E-03	1,29%	1,22E-14

**Table 2.** Result of assessing the contamination of the sample according to the degree of mtDNA heterozygosity

Library ID	Heterozygosity of mtDNA	X/Y
NEV_2.3	0,46%	0,900329024