

Improving Species Identification of Ancient Mammals Based on Next-Generation Sequencing Data

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Table S1. The reference genome used in BWA mapping

Species	No. of Reference genome	Version	Website
<i>Bos primigenius</i>	bosTau8	Jun. 2014	http://hgdownload.cse.ucsc.edu/goldenPath/bosTau8/bigZips/bosTau8.fa.gz
Ancient horse	equCab2	Sep. 2007	http://hgdownload.cse.ucsc.edu/goldenPath/equCab2/bigZips/chromFa.tar.gz
<i>Capra aegagrus hircus</i>	GCF_001704415.1_ARS1	Aug. 2016	ftp://ftp.ncbi.nlm.nih.gov/genomes/all/GCF/001/704/415/GCF_001704415.1_ARS1/GCF_001704415.1_ARS1_genomic.fna.gz
<i>Homo sapiens</i>	GRCh38	Dec. 2013	http://hgdownload.cse.ucsc.edu/goldenPath/hg38/bigZips/hg38.fa.gz
<i>Mammuthus primigenius</i>	loxAfr4	May. 2014	ftp://ftp.broadinstitute.org/distribution/assemblies/mammals/elephant/loxAfr4/Chromosomes.v2.fasta.gz

[†] The mitochondrial genome in the reference genome of woolly mammoth was replaced by a another mitogenome (Acc No. DQ188829.2)

Table S2. Comparison of nt database and mtDNA database for ancient species identification based on BLAST search

Samples	Similarity Ls (%)	nt database (100K)				mtDNA database (100K)			
		SR	VMH	PoVMH (%)	R	SR	VMH	PoVMH (%)	R
British aurochs	L=100	<i>Bos taurus</i>	241,218	24.18	2.50	<i>Bos taurus</i>	878	90.89	23.73
		Uncultured bacterium	96,608	9.69		<i>Bos indicus</i>	37	3.83	
	90≤L≤100	<i>Bos taurus</i>	864,958	33.87	3.73	<i>Bos taurus</i>	1,122	85.58	22.90
		<i>Ovis aries</i>	231,944	9.08		<i>Bos indicus</i>	49	3.74	
	92≤L≤100	<i>Bos taurus</i>	829,441	33.74	3.84	<i>Bos taurus</i>	1,122	85.71	22.90
		<i>Ovis aries</i>	216,002	8.79		<i>Bos indicus</i>	49	3.74	
	94≤L≤100	<i>Bos taurus</i>	730,751	33.10	3.80	<i>Bos taurus</i>	1,118	87.41	23.79
		Uncultured bacterium	192,331	8.71		<i>Bos indicus</i>	47	3.67	
	96≤L≤100	<i>Bos taurus</i>	552,385	31.87	3.64	<i>Bos taurus</i>	1,106	89.63	25.14
		Uncultured bacterium	151,724	8.75		<i>Bos indicus</i>	44	3.57	
	98≤L≤100	<i>Bos taurus</i>	290,131	26.33	2.73	<i>Bos taurus</i>	878	90.89	23.73
		Uncultured bacterium	106,159	9.63		<i>Bos indicus</i>	37	3.83	
JK2911	L=100	<i>Homo sapiens</i>	850,861,037	99.03	996.48	<i>Homo sapiens</i>	5,794,791	99.74	703.17
		<i>Pan troglodytes</i>	853,864	0.10		<i>Pan troglodytes</i>	8,241	0.14	
	90≤L≤100	<i>Homo sapiens</i>	1,356,437,830	94.90	253.72	<i>Homo sapiens</i>	8,879,276	99.72	582.78
		<i>Pan troglodytes</i>	5,346,180	0.37		<i>Pan troglodytes</i>	15,236	0.17	
	92≤L≤100	<i>Homo sapiens</i>	1,356,194,998	95.95	270.79	<i>Homo sapiens</i>	8,865,706	99.73	587.29
		<i>Pan troglodytes</i>	5,008,295	0.35		<i>Pan troglodytes</i>	15,096	0.17	

	94≤L≤100	<i>Homo sapiens</i>	1,355,273,046	96.96	322.92	<i>Homo sapiens</i>	8,833,784	99.74	614.65
		<i>Pan troglodytes</i>	4,196,937	0.30		<i>Pan troglodytes</i>	14,372	0.16	
	96≤L≤100	<i>Homo sapiens</i>	1,333,940,447	98.05	450.99	<i>Homo sapiens</i>	8,665,518	99.75	666.94
		<i>Pan troglodytes</i>	2,957,827	0.22		<i>Pan troglodytes</i>	12,993	0.15	
	98≤L≤100	<i>Homo sapiens</i>	1,185,600,000	98.94	772.77	<i>Homo sapiens</i>	7,774,738	99.77	743.14
		<i>Pan troglodytes</i>	1,534,221	0.13		<i>Pan troglodytes</i>	10,462	0.13	
Direkli5	L=100	Uncultured bacterium	212,162	14.02	1.37	<i>Bos taurus</i>	242	23.45	1.85
		<i>Bos taurus</i>	155,355	10.27		<i>Capra hircus</i>	131	12.69	
		<i>Bos taurus</i>	783,580	20.25	2.26	<i>Bos taurus</i>	511	16.27	1.17
	90≤L≤100	Uncultured bacterium	346,913	8.96		<i>Capra hircus</i>	435	13.85	
		<i>Bos taurus</i>	721,909	20.36	2.15	<i>Bos taurus</i>	507	18.26	1.23
	92≤L≤100	Uncultured bacterium	335,757	9.47		<i>Capra hircus</i>	413	14.88	
		<i>Bos taurus</i>	608,924	19.51	1.90	<i>Bos taurus</i>	417	18.01	1.72
	94≤L≤100	Uncultured bacterium	320,817	10.28		<i>Capra hircus</i>	242	10.45	
		<i>Bos taurus</i>	420,717	16.82	1.49	<i>Bos taurus</i>	402	20.04	1.76
	96≤L≤100	Uncultured bacterium	282,921	11.31		<i>Capra hircus</i>	229	11.42	
		Uncultured bacterium	224,753	13.42	1.14	<i>Bos taurus</i>	325	19.67	1.53
	98≤L≤100	<i>Bos taurus</i>	197,470	11.79		<i>Capra hircus</i>	213	12.89	
Ancient horse	L=100	Uncultured bacterium	177,104	17.34	8.62	<i>Equus caballus</i>	160	91.95	26.67
		<i>Mus musculus</i>	20,548	2.01		<i>Equus przewalskii</i>	6	3.45	

AfontovaGora3	90≤L≤100	Uncultured bacterium	643,460	17.73	13.33	<i>Equus caballus</i>	160	42.44	2.32
		<i>Cyprinus carpio</i>	48,262	1.33		<i>Reclinomonas americana</i>	69	18.30	
	92≤L≤100	Uncultured bacterium	626,106	18.46	13.85	<i>Equus caballus</i>	160	50.31	4.00
		<i>Homo sapiens</i>	45,193	1.33		<i>Reclinomonas americana</i>	40	12.58	
	94≤L≤100	Uncultured bacterium	551,008	19.05	13.99	<i>Equus caballus</i>	160	58.61	5.93
		<i>Homo sapiens</i>	39,375	1.36		<i>Reclinomonas americana</i>	27	9.89	
	96≤L≤100	Uncultured bacterium	429,150	19.42	14.03	<i>Equus caballus</i>	160	74.42	10.67
		<i>Homo sapiens</i>	30,581	1.38		<i>Andalucia godoyi</i>	15	6.98	
	98≤L≤100	Uncultured bacterium	239,897	17.83	10.73	<i>Equus caballus</i>	160	90.40	26.67
		<i>Mus musculus</i>	22,366	1.66		<i>Equus przewalskii</i>	6	3.39	
	L=100	<i>Homo sapiens</i>	35,106,738	66.31	8.22	<i>Homo sapiens</i>	131,479	99.40	369.32
		<i>Pan troglodytes</i>	4,268,849	8.06		<i>Pan troglodytes</i>	356	0.27	
	90≤L≤100	<i>Homo sapiens</i>	114,385,005	64.38	7.62	<i>Homo sapiens</i>	350,591	99.48	596.24
		<i>Pan troglodytes</i>	15,005,101	8.45		<i>Pan troglodytes</i>	588	0.17	
	92≤L≤100	<i>Homo sapiens</i>	108,257,819	64.80	7.55	<i>Homo sapiens</i>	345,879	99.52	588.23
		<i>Pan troglodytes</i>	14,340,123	8.58		<i>Pan troglodytes</i>	588	0.17	
	94≤L≤100	<i>Homo sapiens</i>	95,293,011	65.53	7.53	<i>Homo sapiens</i>	325,542	99.54	568.14
		<i>Pan troglodytes</i>	12,647,500	8.70		<i>Pan troglodytes</i>	573	0.18	

Villabruna	96≤L≤100	<i>Homo sapiens</i>	73,473,822	66.88	7.82	<i>Homo sapiens</i>	280,716	99.57	559.20
		<i>Pan troglodytes</i>	9,398,919	8.56		<i>Pan troglodytes</i>	502	0.18	
	98≤L≤100	<i>Homo sapiens</i>	42,462,571	68.80	8.98	<i>Homo sapiens</i>	204,494	99.59	501.21
		<i>Pan troglodytes</i>	4,729,012	7.66		<i>Pan troglodytes</i>	408	0.20	
	L=100	<i>Homo sapiens</i>	41,721,594	68.26	6.99	<i>Homo sapiens</i>	154,459	99.79	1514.30
		<i>Pan troglodytes</i>	5,967,427	9.76		<i>Pan troglodytes</i>	102	0.07	
	90≤L≤100	<i>Homo sapiens</i>	106,808,926	64.30	7.01	<i>Homo sapiens</i>	216,980	99.68	847.58
		<i>Pan troglodytes</i>	15,243,427	9.18		<i>Pan troglodytes</i>	256	0.12	
	92≤L≤100	<i>Homo sapiens</i>	103,800,584	64.50	6.94	<i>Homo sapiens</i>	215,003	99.69	839.86
		<i>Pan troglodytes</i>	14,954,416	9.29		<i>Pan troglodytes</i>	256	0.12	
	94≤L≤100	<i>Homo sapiens</i>	95,085,144	64.99	6.84	<i>Homo sapiens</i>	211,450	99.70	825.98
		<i>Pan troglodytes</i>	13,911,382	9.51		<i>Pan troglodytes</i>	256	0.12	
	96≤L≤100	<i>Homo sapiens</i>	76,576,760	66.23	6.80	<i>Homo sapiens</i>	203,603	99.72	795.32
		<i>Pan troglodytes</i>	11,267,010	9.74		<i>Pan troglodytes</i>	256	0.13	
	98≤L≤100	<i>Homo sapiens</i>	45,270,262	68.71	7.10	<i>Homo sapiens</i>	174,986	99.75	892.79
		<i>Pan troglodytes</i>	6,379,653	9.68		<i>Pan troglodytes</i>	196	0.11	
N1	L=100	<i>Mus musculus</i>	188,288	15.61	1.61	<i>Mammuthus primigenius</i>	222	80.14	11.68
		<i>Homo sapiens</i>	117,051	9.70		<i>Dolium nationalis</i>	19	6.86	

N2	90≤L≤100	<i>Homo sapiens</i>	601,907	16.81	1.69	<i>Mammuthus primigenius</i>	500	57.34	7.46
		<i>Mus musculus</i>	355,727	9.94		<i>Ursus arctos</i>	67	7.68	
	92≤L≤100	<i>Homo sapiens</i>	435,227	14.60	1.40	<i>Mammuthus primigenius</i>	490	59.61	7.31
		<i>Mus musculus</i>	310,438	10.41		<i>Ursus arctos</i>	67	8.15	
	94≤L≤100	<i>Homo sapiens</i>	317,509	12.94	1.16	<i>Mammuthus primigenius</i>	431	62.10	6.43
		<i>Mus musculus</i>	273,166	11.14		<i>Ursus arctos</i>	67	9.65	
	96≤L≤100	<i>Mus musculus</i>	249,058	12.71	1.19	<i>Mammuthus primigenius</i>	396	65.45	5.91
		<i>Homo sapiens</i>	209,928	10.71		<i>Ursus arctos</i>	67	11.07	
	98≤L≤100	<i>Mus musculus</i>	203,598	14.85	1.61	<i>Mammuthus primigenius</i>	331	79.95	17.42
		<i>Homo sapiens</i>	126,806	9.25		<i>Doliolum nationalis</i>	19	4.59	
	L=100	<i>Mus musculus</i>	311,203	12.88	3.61	<i>Stenopirates sp.</i>	53	46.49	1.06
		<i>Zebrafish DNA</i>	86,226	3.57		<i>Mammuthus primigenius</i>	50	43.86	
	90≤L≤100	<i>Mus musculus</i>	396,387	8.76	1.33	<i>Mammuthus primigenius</i>	140	40.23	1.92
		Uncultured bacterium	298,026	6.58		<i>Stenopirates sp.</i>	73	20.98	
	92≤L≤100	<i>Mus musculus</i>	391,843	9.29	1.45	<i>Mammuthus primigenius</i>	140	47.78	1.97
		Uncultured bacterium	270,712	6.42		<i>Stenopirates sp.</i>	71	24.23	
	94≤L≤100	<i>Mus musculus</i>	381,371	9.97	1.72	<i>Mammuthus primigenius</i>	140	53.64	2.03
		Uncultured bacterium	221,651	5.80		<i>Stenopirates sp.</i>	69	26.44	

N3	96≤L≤100	<i>Mus musculus</i>	364,498	10.69	2.16	<i>Mammuthus primigenius</i>	136	59.39	2.03
		Uncultured bacterium	169,021	4.96		<i>Stenopirates sp.</i>	67	29.26	
	98≤L≤100	<i>Mus musculus</i>	325,866	11.83	2.99	<i>Mammuthus primigenius</i>	96	57.14	1.63
		Uncultured bacterium	109,032	3.96		<i>Stenopirates sp.</i>	59	35.12	
	L=100	<i>Mus musculus</i>	81,195	10.93	1.33	<i>Mammuthus primigenius</i>	292	89.30	29.20
		<i>Homo sapiens</i>	61,027	8.21		<i>Mammuthus columbi</i>	10	3.06	
	90≤L≤100	<i>Homo sapiens</i>	386,508	14.62	2.95	<i>Mammuthus primigenius</i>	656	67.63	12.86
		Uncultured bacterium	130,996	4.95		<i>Loxodonta cyclotis</i>	51	5.26	
	92≤L≤100	<i>Homo sapiens</i>	324,830	14.26	2.10	<i>Mammuthus primigenius</i>	656	77.63	16.82
		Uncultured bacterium	154,548	6.79		<i>Loxodonta cyclotis</i>	39	4.62	
	94≤L≤100	<i>Homo sapiens</i>	239,208	13.23	1.78	<i>Mammuthus primigenius</i>	652	81.70	20.38
		Uncultured bacterium	134,367	7.43		<i>Mammuthus columbi</i>	32	4.01	
	96≤L≤100	<i>Homo sapiens</i>	144,200	10.81	1.36	<i>Mammuthus primigenius</i>	585	86.67	22.50
		Uncultured bacterium	106,135	7.96		<i>Mammuthus columbi</i>	26	3.85	
	98≤L≤100	Uncultured bacterium	69,836	7.93	0.84	<i>Mammuthus primigenius</i>	408	89.47	25.50
		<i>Mus musculus</i>	83,619	9.49		<i>Mammuthus columbi</i>	16	3.51	
N6	L=100	Uncultured bacterium	76,277	20.88	4.45	<i>Mammuthus primigenius</i>	2	50.00	2.00
		<i>Homo sapiens</i>	17,128	4.69		<i>Reclinomonas americana</i>	1	25.00	

N9	90≤L≤100	Uncultured bacterium	350,999	19.41	3.12	<i>Reclinomonas americana</i>	23	18.85	1.15
		<i>Homo sapiens</i>	112,643	6.23		<i>Mammuthus primigenius</i>	20	16.39	
	92≤L≤100	Uncultured bacterium	320,379	20.71	3.19	<i>Mammuthus primigenius</i>	20	22.22	1.18
		<i>Homo sapiens</i>	100,361	6.49		<i>Reclinomonas americana</i>	17	18.89	
	94≤L≤100	Uncultured bacterium	266,273	21.83	3.21	<i>Mammuthus primigenius</i>	20	36.36	2.22
		<i>Homo sapiens</i>	82,884	6.79		<i>Reclinomonas americana</i>	9	16.36	
	96≤L≤100	Uncultured bacterium	193,299	22.39	3.46	<i>Mammuthus primigenius</i>	20	48.78	4.00
		<i>Homo sapiens</i>	55,829	6.47		<i>Reclinomonas americana</i>	5	12.20	
	98≤L≤100	Uncultured bacterium	114,502	22.38	4.11	<i>Mammuthus primigenius</i>	20	68.97	5.00
		<i>Homo sapiens</i>	27,856	5.45		<i>Reclinomonas americana</i>	4	13.79	
	L=100	Uncultured bacterium	85,802	26.68	11.73	<i>Mammuthus primigenius</i>	37	75.51	18.50
		<i>Arthrobacter sp.</i>	7,312	2.27		<i>Geococcyx californianus</i>	2	4.08	
	90≤L≤100	Uncultured bacterium	336,339	14.25	4.15	<i>Mammuthus primigenius</i>	180	55.90	6.21
		<i>Bordetella pertussis</i>	81,133	3.44		<i>Reclinomonas americana</i>	29	9.01	
	92≤L≤100	Uncultured bacterium	311,832	16.38	5.40	<i>Mammuthus primigenius</i>	180	63.16	10.59
		<i>Streptomyces sp.</i>	57,767	3.03		<i>Reclinomonas americana</i>	17	5.96	
	94≤L≤100	Uncultured bacterium	274,361	19.12	6.57	<i>Mammuthus primigenius</i>	180	71.43	15.00
		<i>Streptomyces sp.</i>	41,752	2.91		<i>Loxodonta cyclotis</i>	12	4.76	

N12	96≤L≤100	Uncultured bacterium	216,929	22.29	8.35	<i>Mammuthus primigenius</i>	156	75.73	13.00
		<i>Streptomyces sp.</i>	25,978	2.67		<i>Elephas maximus</i>	12	5.83	
	98≤L≤100	Uncultured bacterium	133,288	27.46	13.44	<i>Mammuthus primigenius</i>	127	79.87	15.88
		<i>Arthrobacter sp.</i>	9,916	2.04		<i>Elephas maximus</i>	8	5.03	
	L=100	Uncultured bacterium	137,895	8.97	1.17	<i>Mammuthus primigenius</i>	126	75.00	15.75
		<i>Mus musculus</i>	117,967	7.67		<i>Sarcophilus harrisii</i>	8	4.76	
	90≤L≤100	Uncultured bacterium	441,502	9.26	2.27	<i>Mammuthus primigenius</i>	400	40.94	5.26
		<i>Pseudomonas sp.</i>	194,697	4.08		<i>Sarcophilus harrisii</i>	76	7.78	
	92≤L≤100	Uncultured bacterium	411,562	9.94	2.28	<i>Mammuthus primigenius</i>	400	45.71	5.33
		<i>Pseudomonas sp.</i>	180,712	4.37		<i>Equus caballus</i>	75	8.57	
	94≤L≤100	Uncultured bacterium	372,038	10.56	2.22	<i>Mammuthus primigenius</i>	397	64.14	14.18
		<i>Pseudomonas sp.</i>	167,392	4.75		<i>Sarcophilus harrisii</i>	28	4.52	
	96≤L≤100	Uncultured bacterium	302,408	10.76	1.98	<i>Mammuthus primigenius</i>	351	75.97	17.55
		<i>Pseudomonas sp.</i>	152,753	5.44		<i>Sarcophilus harrisii</i>	20	4.33	
	98≤L≤100	Uncultured bacterium	213,025	10.69	1.63	<i>Mammuthus primigenius</i>	283	82.75	21.77
		<i>Pseudomonas sp.</i>	130,371	6.54		<i>Mammuthus columbi</i>	13	3.80	

‡ SR: species ranking; VMH: valid mapping hits; PoVMH: proportion of VMH; R: the ratio of the *PoVMH* between the top 1 species and the secondly ranked species.

Table S3. Results of BLAST search by use of animal mtDNA database with selected 3220 sequences

Samples	Similarity Ls (%)	SR	VMH	PoVMH	R	Similarity Ls (%)	SR	VMH	PoVMH	R
British aurochs	L=100	<i>Chrysomya albiceps</i>	4850	0.17	2.31	90≤L<100	<i>Geochelone pardalis</i>	4779	0.06	1.645
		<i>Geochelone pardalis</i>	2100	0.07			<i>Andalucia godoyi</i>	2906	0.03	
	90≤L≤100	<i>Chrysomya albiceps</i>	7117	0.06	1.03	92≤L<100	<i>Geochelone pardalis</i>	4350	0.07	1.784
		<i>Geochelone pardalis</i>	6879	0.06			<i>Andalucia godoyi</i>	2439	0.04	
	92≤L≤100	<i>Chrysomya albiceps</i>	6997	0.07	1.08	94≤L<100	<i>Geochelone pardalis</i>	2172	0.05	1.128
		<i>Geochelone pardalis</i>	6450	0.07			<i>Chrysomya albiceps</i>	1926	0.04	
	94≤L≤100	<i>Chrysomya albiceps</i>	6776	0.09	1.59	96≤L<100	<i>Geochelone pardalis</i>	1293	0.05	1.018
		<i>Geochelone pardalis</i>	4272	0.06			<i>Chrysomya albiceps</i>	1270	0.05	
	96≤L≤100	<i>Chrysomya albiceps</i>	6120	0.11	1.8	98≤L<100	<i>Bos indicus</i>	189	0.06	1.027
		<i>Geochelone pardalis</i>	3393	0.06			<i>Bos taurus</i>	184	0.06	
	98≤L≤100	<i>Chrysomya albiceps</i>	4850	0.15	2.31					
		<i>Geochelone pardalis</i>	2100	0.07						
JK2911	L=100	<i>Homo sapiens</i>	5E+05	0.52	22.2	90≤L<100	<i>Homo sapiens</i>	5E+05	0.09	1.333
		<i>Pan paniscus</i>	21595	0.02			<i>Pan paniscus</i>	3E+05	0.07	
	90≤L≤100	<i>Homo sapiens</i>	9E+05	0.16	2.58	92≤L<100	<i>Homo sapiens</i>	4E+05	0.12	1.937
		<i>Pan paniscus</i>	4E+05	0.06			<i>Pan troglodytes</i>	2E+05	0.06	
	92≤L≤100	<i>Homo sapiens</i>	9E+05	0.20	3.7					
		<i>Pan troglodytes</i>	3E+05	0.06						

AfontovaGora3	90≤L≤100	<i>Andalucia</i> <i>godoyi</i>	1399	0.14	1.02	90≤L<100	<i>Jakoba</i> <i>bahamiensis</i>	1329	0.15	1.137
		<i>Jakoba</i> <i>bahamiensis</i>	1375	0.14			<i>Andalucia</i> <i>godoyi</i>	1169	0.13	
		<i>Andalucia</i> <i>godoyi</i>	1154	0.15	1.09		<i>Jakoba</i> <i>bahamiensis</i>	1017	0.16	1.101
	92≤L≤100	<i>Jakoba</i> <i>bahamiensis</i>	1063	0.14		92≤L<100	<i>Andalucia</i> <i>godoyi</i>	924	0.14	
		<i>Andalucia</i> <i>godoyi</i>	839	0.17	1.32		<i>Andalucia</i> <i>godoyi</i>	609	0.16	1.034
		<i>Jakoba</i> <i>bahamiensis</i>	635	0.13			<i>Jakoba</i> <i>bahamiensis</i>	589	0.15	
	94≤L≤100	<i>Andalucia</i> <i>godoyi</i>	521	0.19	1.54	94≤L<100	<i>Andalucia</i> <i>godoyi</i>	291	0.17	1.017
		<i>Chrysomya</i> <i>albiceps</i>	339	0.12			<i>Jakoba</i> <i>bahamiensis</i>	286	0.17	
		<i>Andalucia</i> <i>godoyi</i>	291	0.21	1.28		<i>Andalucia</i> <i>godoyi</i>	61	0.25	1.452
	96≤L≤100	<i>Chrysomya</i> <i>albiceps</i>	228	0.17		96≤L<100	<i>Jakoba</i> <i>bahamiensis</i>	42	0.17	
	L=100	<i>Homo sapiens</i>	6392	0.51	11.4					
		<i>Geochelone</i> <i>pardalis</i>	563	0.04						
	90≤L≤100	<i>Homo sapiens</i>	16297	0.16	2.85	90≤L<100	<i>Homo sapiens</i>	9905	0.11	1.814
		<i>Pan</i> <i>troglodytes</i>	5712	0.06			<i>Pan</i> <i>troglodytes</i>	5461	0.06	
	92≤L≤100	<i>Homo sapiens</i>	16056	0.21	4.01	92≤L<100	<i>Homo sapiens</i>	9664	0.15	2.577
		<i>Pan</i> <i>troglodytes</i>	4001	0.05			<i>Pan</i> <i>troglodytes</i>	3750	0.06	
	94≤L≤100	<i>Homo sapiens</i>	15446	0.27	6.3	94≤L<100	<i>Homo sapiens</i>	9054	0.21	4.114
		<i>Pan</i> <i>troglodytes</i>	2452	0.04			<i>Pan</i> <i>troglodytes</i>	2201	0.05	
	96≤L≤100	<i>Homo sapiens</i>	13937	0.37	11.3	96≤L<100	<i>Homo sapiens</i>	7545	0.30	7.802
		<i>Pan paniscus</i>	1237	0.03			<i>Pan paniscus</i>	967	0.04	
	98≤L≤100	<i>Homo sapiens</i>	10018	0.52	17.8	98≤L<100	<i>Homo sapiens</i>	3626	0.54	15.24

		<i>Geochelone pardalis</i>	563	0.03			<i>Pan paniscus</i>	238	0.04	
Villabruna	L=100	<i>Chrysomya albiceps</i>	7630	0.18	1.08					
		<i>Geochelone pardalis</i>	7069	0.17						
	90≤L≤100	<i>Chrysomya albiceps</i>	13539	0.11	1.06	90≤L<100	<i>Chrysomya albiceps</i>	5909	0.07	1.036
		<i>Geochelone pardalis</i>	12771	0.10		<i>Geochelone pardalis</i>	5702	0.07		
	92≤L≤100	<i>Chrysomya albiceps</i>	13042	0.12	1.07	92≤L<100	<i>Chrysomya albiceps</i>	5412	0.08	1.057
		<i>Geochelone pardalis</i>	12191	0.11		<i>Geochelone pardalis</i>	5122	0.08		
	94≤L≤100	<i>Chrysomya albiceps</i>	12303	0.13	1.08	94≤L<100	<i>Chrysomya albiceps</i>	4673	0.10	1.085
		<i>Geochelone pardalis</i>	11374	0.12		<i>Geochelone pardalis</i>	4305	0.09		
	96≤L≤100	<i>Chrysomya albiceps</i>	10431	0.15	1.08	96≤L<100	<i>Chrysomya albiceps</i>	2801	0.10	1.051
		<i>Geochelone pardalis</i>	9670	0.14						
	98≤L≤100	<i>Homo sapiens</i>	7793	0.16	1.02	98≤L<100	<i>Homo sapiens</i>	1142	0.23	7.664
		<i>Chrysomya albiceps</i>	7635	0.16		<i>Pan paniscus</i>	149	0.03		
	N1	L=100	<i>Campodea lubbocki</i>	2099	0.29	1.63				
<i>Doliolum nationalis</i>			1290	0.18						
90≤L≤100		<i>Campodea lubbocki</i>	4176	0.14	1.53	90≤L<100	<i>Campodea lubbocki</i>	2077	0.09	1.27
		<i>Doliolum nationalis</i>	2723	0.09		<i>Elephas maximus</i>	1636	0.07		
92≤L≤100		<i>Campodea lubbocki</i>	3756	0.15	1.54	92≤L<100	<i>Campodea lubbocki</i>	1657	0.10	1.224

N2	94≤L≤100	<i>Doliolum nationalis</i>	2435	0.10	1.6	94≤L<100	<i>Mammuthus columbi</i>	1354	0.08	1.117	
		<i>Campodea lubbocki</i>	3487	0.17			<i>Campodea lubbocki</i>	1388	0.11		
		<i>Doliolum nationalis</i>	2181	0.11			<i>Mammuthus columbi</i>	1243	0.10		
		<i>Campodea lubbocki</i>	2792	0.20			<i>Mammuthus columbi</i>	1066	0.16		
	96≤L≤100	<i>Mammuthus primigenius</i>	1668	0.12	1.67	96≤L<100	<i>Mammuthus primigenius</i>	1040	0.16	1.025	
		<i>Campodea lubbocki</i>	2099	0.23			<i>Mammuthus columbi</i>	668	0.37		
	98≤L≤100	<i>Doliolum nationalis</i>	1290	0.14	1.63	98≤L<100	<i>Mammuthus primigenius</i>	659	0.37	1.014	
		L=100	<i>Stenopirates sp.</i>	4137	0.79	15.9					
			<i>Mammuthus primigenius</i>	260	0.05						
			<i>Stenopirates sp.</i>	5966	0.32			5.98	90≤L<100	<i>Stenopirates sp.</i>	1829
		<i>Andalucia godoyi</i>	998	0.05	<i>Andalucia godoyi</i>	977	0.07				
		<i>Stenopirates sp.</i>	5863	0.40	6.51	92≤L<100	<i>Stenopirates sp.</i>			1726	0.18
		<i>Mammuthus primigenius</i>	901	0.06			<i>Mammuthus columbi</i>	649	0.07		
		94≤L≤100	<i>Stenopirates sp.</i>	5649			0.48	6.55	94≤L<100	<i>Stenopirates sp.</i>	1512
			<i>Mammuthus primigenius</i>	862	0.07	<i>Mammuthus columbi</i>	603			0.09	
			<i>Stenopirates sp.</i>	5242	0.59	6.73	96≤L<100			<i>Stenopirates sp.</i>	1105
		96≤L≤100	<i>Mammuthus primigenius</i>	779	0.09			<i>Mammuthus primigenius</i>	519	0.14	
			98≤L≤100	<i>Stenopirates sp.</i>	4464			0.70	8.25	98≤L<100	<i>Stenopirates sp.</i>

		<i>Mammuthus primigenius</i>	541	0.08			<i>Mammuthus primigenius</i>	281	0.24	
	L=100	<i>Mammuthus primigenius</i>	1589	0.24	1.02					
		<i>Mammuthus columbi</i>	1564	0.24						
	90≤L≤100	<i>Mammuthus primigenius</i>	4296	0.11	1	90≤L<100	<i>Elephas maximus</i>	3206	0.09	1.017
		<i>Mammuthus columbi</i>	4286	0.11			<i>Loxodonta cyclotis</i>	3153	0.09	
	92≤L≤100	<i>Mammuthus primigenius</i>	4189	0.14	1	92≤L<100	<i>Elephas maximus</i>	2736	0.12	1.02
		<i>Mammuthus columbi</i>	4185	0.14			<i>Loxodonta cyclotis</i>	2683	0.12	
N3	94≤L≤100	<i>Mammuthus primigenius</i>	4033	0.18	1.01	94≤L<100	<i>Mammuthus primigenius</i>	2444	0.15	1.002
		<i>Mammuthus columbi</i>	4004	0.18			<i>Mammuthus columbi</i>	2440	0.15	
	96≤L≤100	<i>Mammuthus primigenius</i>	3654	0.22	1.02	96≤L<100	<i>Mammuthus primigenius</i>	2065	0.20	1.017
		<i>Mammuthus columbi</i>	3595	0.22			<i>Mammuthus columbi</i>	2031	0.20	
	98≤L≤100	<i>Mammuthus primigenius</i>	2783	0.27	1.03	98≤L<100	<i>Mammuthus primigenius</i>	1194	0.30	1.059
		<i>Mammuthus columbi</i>	2692	0.26			<i>Mammuthus columbi</i>	1128	0.29	
	L=100	<i>Seculamonas ecuadoriensis</i>	52	0.10	1.24					
		<i>Adoxophyes honmai</i>	42	0.08						
	90≤L≤100	<i>Andalucia godoyi</i>	969	0.14	1.13	90≤L<100	<i>Andalucia godoyi</i>		0.15	1.137
		<i>Reclinomonas americana</i>	854	0.12			<i>Reclinomonas americana</i>	833	0.13	
	92≤L≤100	<i>Andalucia godoyi</i>	642	0.14	1.16	92≤L<100	<i>Andalucia godoyi</i>	620	0.15	1.165

N9	94≤L≤100	<i>Reclinomonas americana</i>	553	0.12	1.16	94≤L<100	<i>Reclinomonas americana</i>	532	0.13	1.17	
		<i>Andalucia godoyi</i>	379	0.13			<i>Andalucia godoyi</i>	357	0.15		
		<i>Reclinomonas americana</i>	326	0.11			<i>Reclinomonas americana</i>	305	0.13		
	96≤L≤100	<i>Reclinomonas americana</i>	150	0.10	1	96≤L<100	<i>Reclinomonas americana</i>	129	0.13	1.008	
		<i>Andalucia godoyi</i>	150	0.10			<i>Andalucia godoyi</i>	128	0.12		
		<i>Mammuthus primigenius</i>	87	0.12			<i>Mammuthus primigenius</i>	57	0.24		
	98≤L≤100	<i>Mammuthus columbi</i>	78	0.10	1.12	98≤L<100	<i>Mammuthus columbi</i>	45	0.19	1.267	
		L=100	<i>Mammuthus primigenius</i>	165	0.17	1.07					
			<i>Mammuthus columbi</i>	154	0.16						
		90≤L≤100	<i>Andalucia godoyi</i>	1129	0.10	1.08	90≤L<100	<i>Andalucia godoyi</i>	1104	0.11	1.079
			<i>Reclinomonas americana</i>	1042	0.09			<i>Reclinomonas americana</i>	1023	0.10	
		92≤L≤100	<i>Andalucia godoyi</i>	744	0.09	1.03	92≤L<100	<i>Andalucia godoyi</i>	719	0.10	1.035
			<i>Seculamonas ecuadoriensis</i>	720	0.09			<i>Seculamonas ecuadoriensis</i>	695	0.10	
		94≤L≤100	<i>Mammuthus primigenius</i>	526	0.11	1	94≤L<100	<i>Andalucia godoyi</i>	427	0.11	1.154
			<i>Mammuthus columbi</i>	524	0.11			<i>Mammuthus columbi</i>	370	0.09	
		96≤L≤100	<i>Mammuthus primigenius</i>	473	0.16	1.02	96≤L<100	<i>Mammuthus columbi</i>	310	0.16	1.006
			<i>Mammuthus columbi</i>	464	0.16			<i>Mammuthus primigenius</i>	308	0.16	
98≤L≤100		<i>Mammuthus primigenius</i>	334	0.21	1.02	98≤L<100	<i>Mammuthus columbi</i>	173	0.28	1.024	

N12		<i>Mammuthus columbi</i>	327	0.20				<i>Mammuthus primigenius</i>	169	0.27	
	L=100	<i>Campodea lubbocki</i>	1028	0.21	1.62						
		<i>Mammuthus primigenius</i>	634	0.13							
	90≤L≤100	<i>Mammuthus primigenius</i>	2165	0.07	1	90≤L<100	<i>Elephas maximus</i>	1739	0.06	1.039	
		<i>Mammuthus columbi</i>	2165	0.07			<i>Loxodonta cyclotis</i>	1673	0.06		
	92≤L≤100	<i>Mammuthus primigenius</i>	2127	0.09	1	92≤L<100	<i>Mammuthus columbi</i>	1500	0.08	1.005	
		<i>Mammuthus columbi</i>	2121	0.09			<i>Mammuthus primigenius</i>	1493	0.08		
	94≤L≤100	<i>Mammuthus primigenius</i>	2042	0.11	1	94≤L<100	<i>Mammuthus columbi</i>	1412	0.11	1.003	
		<i>Mammuthus columbi</i>	2033	0.11			<i>Mammuthus primigenius</i>	1408	0.11		
	96≤L≤100	<i>Mammuthus primigenius</i>	1844	0.15	1.01	96≤L<100	<i>Mammuthus primigenius</i>	1210	0.16	1.002	
		<i>Mammuthus columbi</i>	1829	0.15			<i>Mammuthus columbi</i>	1208	0.16		
	98≤L≤100	<i>Mammuthus primigenius</i>	1380	0.18	1.03	98≤L<100	<i>Mammuthus primigenius</i>	746	0.27	1.039	
		<i>Mammuthus columbi</i>	1339	0.17			<i>Mammuthus columbi</i>	718	0.26		

‡ SR: species ranking; VMH: valid mapping hits; PoVMH: proportion of VMH; R: the ratio of the *PoVMH* between the top 1 species and the secondly ranked species.

Table S4. Results of BLAST search by use of whole animal mtDNA database

Samples	Similarity Ls (%)	SR	VMH	PoVMH (%)	R	Similarity Ls (%)	SR	VMH	PoVMH (%)	R
British aurochs	L=100	<i>Bos taurus</i>	329165	0.82	20.24	90≤L<100	<i>Bos taurus</i>	114188	0.59	7.09
		<i>Bos grunniens</i>	16265	0.04	<i>Sarcophilus harrisii</i>		16111	0.08		
		<i>Bos taurus</i>	443353	0.74	17.85		<i>Bos taurus</i>	111515	0.61	7.17
	92≤L≤100	<i>Bos grunniens</i>	24843	0.04	92≤L<100	<i>Sarcophilus harrisii</i>	15557	0.09	7.19	
		<i>Bos taurus</i>	440680	0.75		18.32	<i>Bos taurus</i>	103730		0.65
	94≤L≤100	<i>Bos grunniens</i>	24060	0.04	94≤L<100	<i>Sarcophilus harrisii</i>	14424	0.09	10.28	
		<i>Bos taurus</i>	432895	0.77		18.84	<i>Bos taurus</i>	91105		0.71
	96≤L≤100	<i>Bos indicus</i>	21251	0.04	96≤L<100	<i>Sarcophilus harrisii</i>	8865	0.07	21.01	
		<i>Bos taurus</i>	420270	0.79		19.78	<i>Bos taurus</i>	40407		0.85
	98≤L≤100	<i>Bos grunniens</i>	17844	0.04	98≤L<100	<i>Bos indicus</i>	1923	0.04		
	JK2911	L=100	<i>Homo sapiens</i>	35462589	1.00	1781.95	90≤L<100	<i>Homo sapiens</i>	20860875	1.00
<i>Pan troglodytes</i>			19901	0.00	1537.21	<i>Pan troglodytes</i>		16739	0.00	1275.94
<i>Homo sapiens</i>			56323464	1.00		<i>Homo sapiens</i>		20746859	1.00	
92≤L≤100		<i>Pan troglodytes</i>	36640	0.00	92≤L<100	<i>Pan troglodytes</i>	16260	0.00	1410.09	
		<i>Homo sapiens</i>	56209448	1.00		1554.42	<i>Homo sapiens</i>	20477265		1.00
94≤L≤100		<i>Pan troglodytes</i>	36161	0.00	94≤L<100	<i>Pan troglodytes</i>	14522	0.00	1649.44	
		<i>Homo sapiens</i>	55939854	1.00		1625.07	<i>Homo sapiens</i>	19151671		1.00
96≤L≤100		<i>Pan troglodytes</i>	34423	0.00	96≤L<100	<i>Pan troglodytes</i>	11611	0.00	2730.86	
		<i>Homo sapiens</i>	54614260	1.00		1733.13				
98≤L≤100		<i>Pan troglodytes</i>	31512	0.00	98≤L<100	<i>Homo sapiens</i>	13069897	1.00		
		<i>Homo sapiens</i>	48532486	1.00		1965.91				

		<i>Pan troglodytes</i>	24687	0.00			<i>Pan troglodytes</i>	4786	0.00		
Direkli5	L=100	<i>Capra hircus</i>	27033	0.19	1.44						
		<i>Bos taurus</i>	18712	0.13							
	90≤L≤100	<i>Bos taurus</i>	132649	0.17	1.31	90≤L<100	<i>Bos taurus</i>	113937	0.18	1.54	
		<i>Capra hircus</i>	100971	0.13			<i>Capra hircus</i>	73938	0.12		
	92≤L≤100	<i>Bos taurus</i>	100449	0.16	1.07	92≤L<100	<i>Bos taurus</i>	81737	0.16	1.22	
		<i>Capra hircus</i>	94034	0.15			<i>Capra hircus</i>	67001	0.14		
	94≤L≤100	<i>Capra hircus</i>	84025	0.17	1.23	94≤L<100	<i>Capra hircus</i>	56992	0.17	1.15	
		<i>Bos taurus</i>	68064	0.14			<i>Bos taurus</i>	49352	0.15		
	96≤L≤100	<i>Capra hircus</i>	70124	0.21	1.57	96≤L<100	<i>Capra hircus</i>	43091	0.22	1.66	
		<i>Bos taurus</i>	44707	0.13			<i>Bos taurus</i>	25995	0.13		
	98≤L≤100	<i>Capra hircus</i>	43241	0.22	1.81	98≤L<100	<i>Capra hircus</i>	16208	0.29	3.10	
		<i>Bos taurus</i>	23942	0.12			<i>Bos taurus</i>	5230	0.09		
Ancient horse	L=100	<i>Equus caballus</i>	10393	0.80	10.39						
		<i>Homo sapiens</i>	1000	0.08							
	90≤L≤100	<i>Equus caballus</i>	19718	0.51	5.44	90≤L<100	<i>Equus caballus</i>	9325	0.36	2.67	
		<i>Reclinomonas americana</i>	3624	0.09			<i>Reclinomonas americana</i>	3486	0.14		
	92≤L≤100	<i>Equus caballus</i>	19632	0.57	7.38	92≤L<100	<i>Equus caballus</i>	9239	0.43	3.66	
		<i>Reclinomonas americana</i>	2659	0.08			<i>Reclinomonas americana</i>	2521	0.12		
	94≤L≤100	<i>Equus caballus</i>	18967	0.66	12.69	94≤L<100	<i>Equus caballus</i>	8574	0.55	6.32	
		<i>Reclinomonas americana</i>	1495	0.05			<i>Reclinomonas americana</i>	1357	0.09		
	96≤L≤100	<i>Equus caballus</i>	17219	0.74	17.22	96≤L<100	<i>Equus caballus</i>	6826	0.67	11.55	
		<i>Homo sapiens</i>	1000	0.04			<i>Reclinomonas americana</i>	591	0.06		
	98≤L≤100	<i>Equus caballus</i>	14714	0.82	14.71	98≤L<100	<i>Equus caballus</i>	4321	0.89	37.25	
		<i>Homo sapiens</i>	1000	0.06			<i>Equus przewalskii</i>	116	0.02		
AfontovaG ora3	L=100	<i>Homo sapiens</i>	1420059	1.00	647.84						
		<i>Pan troglodytes</i>	2192	0.00							
	90≤L≤100	<i>Homo sapiens</i>	4057259	1.00	780.24		90≤L<100	<i>Homo sapiens</i>	2637200	1.00	609.90

		<i>Sarcophilus harrisii</i>	5200	0.00			<i>Sarcophilus harrisii</i>	4324	0.00	
		<i>Homo sapiens</i>	3988477	1.00	918.16		<i>Homo sapiens</i>	2568418	1.00	740.60
	92≤L≤100	<i>Sarcophilus harrisii</i>	4344	0.00			92≤L<100	<i>Sarcophilus harrisii</i>	3468	0.00
		<i>Homo sapiens</i>	3804427	1.00	997.49			<i>Homo sapiens</i>	2384368	1.00
	94≤L≤100	<i>Pan troglodytes</i>	3814	0.00			94≤L<100	<i>Sarcophilus harrisii</i>	2370	0.00
		<i>Homo sapiens</i>	3360442	1.00	967.31			<i>Homo sapiens</i>	1940383	1.00
	96≤L≤100	<i>Pan troglodytes</i>	3474	0.00			96≤L<100	<i>Pan troglodytes</i>	1282	0.00
		<i>Homo sapiens</i>	2398134	1.00	946.38			<i>Homo sapiens</i>	978075	1.00
	98≤L≤100	<i>Pan troglodytes</i>	2534	0.00			98≤L<100	<i>Pan troglodytes</i>	342	0.00
Villabruna	L=100	<i>Homo sapiens</i>	1641905	0.98	151.20					
		<i>Sarcophilus harrisii</i>	10859	0.01						
	90≤L≤100	<i>Homo sapiens</i>	2390295	0.97	65.47		90≤L<100	<i>Homo sapiens</i>	748390	0.94
		<i>Sarcophilus harrisii</i>	36508	0.01				<i>Sarcophilus harrisii</i>	25649	0.03
	92≤L≤100	<i>Homo sapiens</i>	2367275	0.97	70.61		92≤L<100	<i>Homo sapiens</i>	725370	0.95
		<i>Sarcophilus harrisii</i>	33524	0.01				<i>Sarcophilus harrisii</i>	22665	0.03
	94≤L≤100	<i>Homo sapiens</i>	2330725	0.97	84.66		94≤L<100	<i>Homo sapiens</i>	688820	0.96
		<i>Sarcophilus harrisii</i>	27529	0.01				<i>Sarcophilus harrisii</i>	16670	0.02
	96≤L≤100	<i>Homo sapiens</i>	2240322	0.98	111.26		96≤L<100	<i>Homo sapiens</i>	598417	0.97
		<i>Sarcophilus harrisii</i>	20136	0.01				<i>Sarcophilus harrisii</i>	9277	0.02
	98≤L≤100	<i>Homo sapiens</i>	1910294	0.98	175.26		98≤L<100	<i>Homo sapiens</i>	268389	1.00
		<i>Sarcophilus harrisii</i>	10900	0.01				<i>Pan troglodytes</i>	262	0.00
N1	L=100	<i>Mammuthus primigenius</i>	15963	0.70	9.76					
		<i>Campodea lubbocki</i>	1635	0.07						

N2	90≤L≤100	<i>Mammuthus primigenius</i>	41877	0.51	7.80	90≤L<100	<i>Mammuthus primigenius</i>	25914	0.43	5.22	
		<i>Sarcophilus harrisii</i>	5366	0.06			<i>Sarcophilus harrisii</i>	4966	0.08		
	92≤L≤100	<i>Mammuthus primigenius</i>	40508	0.55	9.87	92≤L<100	<i>Mammuthus primigenius</i>	24545	0.49	6.62	
		<i>Sarcophilus harrisii</i>	4106	0.06			<i>Sarcophilus harrisii</i>	3706	0.07		
	94≤L≤100	<i>Mammuthus primigenius</i>	38348	0.60	16.64	94≤L<100	<i>Mammuthus primigenius</i>	22385	0.55	11.28	
		<i>Sarcophilus harrisii</i>	2304	0.04			<i>Elephas maximus</i>	1985	0.05		
	96≤L≤100	<i>Mammuthus primigenius</i>	34593	0.67	17.61	96≤L<100	<i>Mammuthus primigenius</i>	18630	0.64	16.75	
		<i>Campodea lubbocki</i>	1964	0.04			<i>Elephas maximus</i>	1112	0.04		
	98≤L≤100	<i>Mammuthus primigenius</i>	27488	0.73	16.81	98≤L<100	<i>Mammuthus primigenius</i>	11525	0.78	16.61	
		<i>Campodea lubbocki</i>	1635	0.04			<i>Mammuthus columbi</i>	694	0.05		
		L=100	<i>Mammuthus primigenius</i>	6624	0.56	1.67					
			<i>Stenopirates sp.</i>	3960	0.34						
		90≤L≤100	<i>Mammuthus primigenius</i>	18975	0.44	3.37	90≤L<100	<i>Mammuthus primigenius</i>	12351	0.40	4.86
			<i>Stenopirates sp.</i>	5627	0.13			<i>Reclinomonas americana</i>	2542	0.08	
		92≤L≤100	<i>Mammuthus primigenius</i>	18676	0.50	3.37	92≤L<100	<i>Mammuthus primigenius</i>	12052	0.48	7.59
			<i>Stenopirates sp.</i>	5547	0.15			<i>Stenopirates sp.</i>	1587	0.06	
94≤L≤100		<i>Mammuthus primigenius</i>	17860	0.57	3.33	94≤L<100	<i>Mammuthus primigenius</i>	11236	0.57	8.04	
		<i>Stenopirates sp.</i>	5358	0.17			<i>Stenopirates sp.</i>	1398	0.07		
96≤L≤100		<i>Mammuthus primigenius</i>	15976	0.62	3.20	96≤L<100	<i>Mammuthus primigenius</i>	9352	0.67	9.06	

		<i>Stenopirates</i> <i>sp.</i>	4992	0.19			<i>Stenopirates</i> <i>sp.</i>	1032	0.07	
	98≤L≤100	<i>Mammuthus</i> <i>primigenius</i>	11811	0.65	2.76		<i>Mammuthus</i> <i>primigenius</i>	5187	0.81	15.96
		<i>Stenopirates</i> <i>sp.</i>	4285	0.24		98≤L<100	<i>Stenopirates</i> <i>sp.</i>	325	0.05	
N3	L=100	<i>Mammuthus</i> <i>primigenius</i>	37196	0.82	15.13					
		<i>Homo sapiens</i>	2459	0.05						
	90≤L≤100	<i>Mammuthus</i> <i>primigenius</i>	86297	0.57	12.18		<i>Mammuthus</i> <i>primigenius</i>	49101	0.47	7.63
		<i>Elephas</i> <i>maximus</i>	7085	0.05		90≤L<100	<i>Elephas</i> <i>maximus</i>	6436	0.06	
	92≤L≤100	<i>Mammuthus</i> <i>primigenius</i>	84883	0.64	13.74		<i>Mammuthus</i> <i>primigenius</i>	47687	0.55	8.62
		<i>Elephas</i> <i>maximus</i>	6178	0.05		92≤L<100	<i>Elephas</i> <i>maximus</i>	5529	0.06	
	94≤L≤100	<i>Mammuthus</i> <i>primigenius</i>	81917	0.71	17.66		<i>Mammuthus</i> <i>primigenius</i>	44721	0.64	11.21
		<i>Elephas</i> <i>maximus</i>	4639	0.04		94≤L<100	<i>Elephas</i> <i>maximus</i>	3990	0.06	
	96≤L≤100	<i>Mammuthus</i> <i>primigenius</i>	75114	0.78	20.49		<i>Mammuthus</i> <i>primigenius</i>	37918	0.74	16.88
		<i>Mammuthus</i> <i>columbi</i>	3665	0.04		96≤L<100	<i>Elephas</i> <i>maximus</i>	2246	0.04	
	98≤L≤100	<i>Mammuthus</i> <i>primigenius</i>	58657	0.82	20.19		<i>Mammuthus</i> <i>primigenius</i>	21461	0.83	18.42
		<i>Homo sapiens</i>	2905	0.04		98≤L<100	<i>Mammuthus</i> <i>columbi</i>	1165	0.04	
N6	L=100	<i>Mammuthus</i> <i>primigenius</i>	790	0.60	16.12					
		<i>Seculamonas</i> <i>ecuadoriensis</i>	49	0.04						
	90≤L≤100	<i>Mammuthus</i> <i>primigenius</i>	3539	0.25	1.22		<i>Reclinomonas</i> <i>americana</i>	2865	0.23	1.04
		<i>Reclinomonas</i> <i>americana</i>	2909	0.21		90≤L<100	<i>Mammuthus</i> <i>primigenius</i>	2749	0.22	

N9	92≤L≤100	<i>Mammuthus primigenius</i>	3453	0.32	1.85	92≤L<100	<i>Mammuthus primigenius</i>	2663	0.28	1.46
		<i>Reclinomonas americana</i>	1868	0.17			<i>Reclinomonas americana</i>	1824	0.19	
	94≤L≤100	<i>Mammuthus primigenius</i>	3355	0.43	4.46	94≤L<100	<i>Mammuthus primigenius</i>	2565	0.40	3.62
		<i>Reclinomonas americana</i>	752	0.10			<i>Reclinomonas americana</i>	708	0.11	
	96≤L≤100	<i>Mammuthus primigenius</i>	2760	0.53	8.39	96≤L<100	<i>Mammuthus primigenius</i>	1970	0.51	6.91
		<i>Reclinomonas americana</i>	329	0.06			<i>Reclinomonas americana</i>	285	0.07	
	98≤L≤100	<i>Mammuthus primigenius</i>	1656	0.64	17.07	98≤L<100	<i>Mammuthus primigenius</i>	866	0.68	11.10
		<i>Reclinomonas americana</i>	97	0.04			<i>Bos grunniens</i>	78	0.06	
	L=100	<i>Mammuthus primigenius</i>	3887	0.75	15.36	90≤L<100	<i>Mammuthus primigenius</i>	8161	0.34	2.43
		<i>Homo sapiens</i>	253	0.05			<i>Reclinomonas americana</i>	3360	0.14	
	90≤L≤100	<i>Mammuthus primigenius</i>	12048	0.41	3.52	92≤L<100	<i>Mammuthus primigenius</i>	7888	0.44	4.01
		<i>Reclinomonas americana</i>	3427	0.12			<i>Reclinomonas americana</i>	1967	0.11	
	92≤L≤100	<i>Mammuthus primigenius</i>	11775	0.51	5.79	94≤L<100	<i>Mammuthus primigenius</i>	7204	0.56	8.73
		<i>Reclinomonas americana</i>	2034	0.09			<i>Reclinomonas americana</i>	825	0.06	
	94≤L≤100	<i>Mammuthus primigenius</i>	11091	0.62	12.43	96≤L<100	<i>Mammuthus primigenius</i>	6066	0.69	16.90
		<i>Reclinomonas americana</i>	892	0.05			<i>Elephas maximus</i>	359	0.04	
	96≤L≤100	<i>Mammuthus primigenius</i>	9953	0.71	20.31	98≤L<100	<i>Mammuthus primigenius</i>	3318	0.82	18.43
	98≤L≤100	<i>Mammuthus primigenius</i>	490	0.04						
		<i>Mammuthus primigenius</i>	7205	0.78	20.70					

		<i>Mammuthus columbi</i>	348	0.04			<i>Mammuthus columbi</i>	180	0.04	
N12	L=100	<i>Mammuthus primigenius</i>	17030	0.79	22.17					
		<i>Campodea lubbocki</i>	768	0.04						
	90≤L≤100	<i>Mammuthus primigenius</i>	44271	0.49	9.27	90≤L<100	<i>Mammuthus primigenius</i>	27241	0.40	6.08
		<i>Sarcophilus harrisii</i>	4775	0.05			<i>Reclinomonas americana</i>	4480	0.07	
	92≤L≤100	<i>Mammuthus primigenius</i>	43562	0.57	11.43	92≤L<100	<i>Mammuthus primigenius</i>	26532	0.48	7.63
		<i>Sarcophilus harrisii</i>	3811	0.05			<i>Sarcophilus harrisii</i>	3477	0.06	
	94≤L≤100	<i>Mammuthus primigenius</i>	42091	0.65	17.83	94≤L<100	<i>Mammuthus primigenius</i>	25061	0.58	11.69
		<i>Elephas maximus</i>	2361	0.04			<i>Elephas maximus</i>	2144	0.05	
	96≤L≤100	<i>Mammuthus primigenius</i>	38192	0.73	20.39	96≤L<100	<i>Mammuthus primigenius</i>	21162	0.69	17.30
		<i>Mammuthus columbi</i>	1873	0.04			<i>Mammuthus columbi</i>	1223	0.04	
	98≤L≤100	<i>Mammuthus primigenius</i>	29995	0.80	21.59	98≤L<100	<i>Mammuthus primigenius</i>	12965	0.82	17.54
		<i>Mammuthus columbi</i>	1389	0.04			<i>Mammuthus columbi</i>	739	0.05	

‡ SR: species ranking; VMH: valid mapping hits; PoVMH: proportion of VMH; R: the ratio of the *PoVMH* between the top 1 species and the secondly ranked species.

Table S5. Analysis of One-Way ANOVA with LSD for *R* values of different similarities by use of whole animal mtDNA database based on BLAST search

Similarity Ls		Mean difference (I-J)	Std.Error	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound
90≤L≤100	92≤L≤100	-1.20517	3.24483	.712	-7.7293	5.3190
	94≤L≤100	-4.79596	3.24483	.146	-11.3201	1.7282
	96≤L≤100	-7.44488*	3.24483	.026	-13.9691	-.9207
	98≤L≤100	-8.26684*	3.24483	.014	-14.7910	-1.7427
	L=100	-5.59304	3.24483	.091	-12.1172	.9311
92≤L≤100	90≤L≤100	1.20517	3.24483	.712	-5.3190	7.7293
	94≤L≤100	-3.59079	3.24483	.274	-10.1150	2.9334
	96≤L≤100	-6.23972	3.24483	.060	-12.7639	.2845
	98≤L≤100	-7.06167*	3.24483	.034	-13.5858	-.5375
	L=100	-4.38788	3.24483	.183	-10.9120	2.1363
94≤L≤100	90≤L≤100	4.79596	3.24483	.146	-1.7282	11.3201
	92≤L≤100	3.59079	3.24483	.274	-2.9334	10.1150
	96≤L≤100	-2.64893	3.24483	.418	-9.1731	3.8752
	98≤L≤100	-3.47088	3.24483	.290	-9.9951	3.0533
	L=100	-.79709	3.24483	.807	-7.3213	5.7271
96≤L≤100	90≤L≤100	7.44488*	3.24483	.026	.9207	13.9691
	92≤L≤100	6.23972	3.24483	.060	-.2845	12.7639
	94≤L≤100	2.64893	3.24483	.418	-3.8752	9.1731
	98≤L≤100	-.82196	3.24483	.801	-7.3461	5.7022
	L=100	1.85184	3.24483	.571	-4.6723	8.3760
98≤L≤100	90≤L≤100	8.26684*	3.24483	.014	1.7427	14.7910
	92≤L≤100	7.06167*	3.24483	.034	.5375	13.5858
	94≤L≤100	3.47088	3.24483	.290	-3.0533	9.9951
	96≤L≤100	.82196	3.24483	.801	-5.7022	7.3461
	L=100	2.67380	3.24483	.414	-3.8504	9.1980
L=100	90≤L≤100	5.59304	3.24483	.091	-.9311	12.1172
	92≤L≤100	4.38788	3.24483	.183	-2.1363	10.9120
	94≤L≤100	.79709	3.24483	.807	-5.7271	7.3213
	96≤L≤100	-1.85184	3.24483	.571	-8.3760	4.6723
	98≤L≤100	-2.67380	3.24483	.414	-9.1980	3.8504

‡ The mean difference is significant at the 0.05 level.

Table S6. Analysis of One-Way ANOVA with LSD for R values of different similarities (without 100%) by use of whole animal mtDNA database based on BLAST search

Similarity Ls (%)		Mean difference (I-J)	Std.Error	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound
90≤L<100	92≤L<100	-1.04828	2.48597	.676	-6.0726	3.9761
	94≤L<100	-3.40775	2.48597	.178	-8.4321	1.6166
	96≤L<100	-7.63709*	2.48597	.004	-12.6614	-2.6128
	98≤L<100	-13.42979*	2.48597	.000	-18.4541	-8.4055
92≤L<100	90≤L<100	1.04828	2.48597	.676	-3.9761	6.0726
	94≤L<100	-2.35946	2.48597	.348	-7.3838	2.6649
	96≤L<100	-6.58881*	2.48597	.011	-11.6131	-1.5645
	98≤L<100	-12.38151*	2.48597	.000	-17.4058	-7.3572
94≤L<100	90≤L<100	3.40775	2.48597	.178	-1.6166	8.4321
	92≤L<100	2.35946	2.48597	.348	-2.6649	7.3838
	96≤L<100	-4.22934	2.48597	.097	-9.2537	.7950
	98≤L<100	-10.02204*	2.48597	.000	-15.0464	-4.9977
96≤L<100	90≤L<100	7.63709*	2.48597	.004	2.6128	12.6614
	92≤L<100	6.58881*	2.48597	.011	1.5645	11.6131
	94≤L<100	4.22934	2.48597	.097	-.7950	9.2537
	98≤L<100	-5.79270*	2.48597	.025	-10.8170	-.7684
98≤L<100	90≤L<100	13.42979*	2.48597	.000	8.4055	18.4541
	92≤L<100	12.38151*	2.48597	.000	7.3572	17.4058
	94≤L<100	10.02204*	2.48597	.000	4.9977	15.0464
	96≤L<100	5.79270*	2.48597	.025	.7684	10.8170

‡ The mean difference is significant at the 0.05 level.

Table S7. Comparisons of species identification under different query coverages by use of BLAST search based on whole animal mtDNA database

Species	Coverage (C, %)	The top1 species	VMH	PoVMH of top1 species	PoVMH of secondly ranked species	R
British aurochs	C < 90	<i>Bos taurus</i>	137	0.30	0.16	1.83
	90 ≤ C < 92	<i>Bos taurus</i>	146	0.54	0.27	2.00
	92 ≤ C < 94	<i>Bos taurus</i>	680	0.85	0.03	26.15
	94 ≤ C < 96	<i>Bos taurus</i>	473	0.79	0.04	17.52
	96 ≤ C < 98	<i>Bos taurus</i>	605	0.69	0.09	7.56
	98 ≤ C < 100	<i>Bos taurus</i>	317	0.43	0.32	1.34
	98 ≤ C ≤ 100	<i>Bos taurus</i>	33476	0.86	0.04	20.95
	C = 100	<i>Bos taurus</i>	33159	0.87	0.04	20.95
Direkli5	C < 90	<i>Capra hircus</i>	584	0.32	0.11	2.91
	90 ≤ C < 92	<i>Bos taurus</i>	45	0.27	0.25	1.07
	92 ≤ C < 94	<i>Capra hircus</i>	79	0.71	0.07	9.88
	94 ≤ C < 96	<i>Capra hircus</i>	179	0.42	0.25	1.67
	96 ≤ C < 98	<i>Capra hircus</i>	56	0.39	0.13	2.95
	98 ≤ C < 100	<i>Capra hircus</i>	193	0.19	0.19	1.02
	98 ≤ C ≤ 100	<i>Capra hircus</i>	13378	0.28	0.10	2.71
	C = 100	<i>Capra hircus</i>	13185	0.28	0.10	2.78
Ancient Horse	C < 90	<i>Andalucia godoyi</i>	9	0.26	0.18	1.50
	90 ≤ C < 92	<i>Equus caballus</i>	204	0.95	0.03	29.14
	92 ≤ C < 94	<i>Equus caballus</i>	131	0.88	0.05	16.38
	94 ≤ C < 96	<i>Reclinomonas americana</i>	6	0.43	0.21	2.00
	96 ≤ C < 98	<i>Reclinomonas americana</i>	4	0.57	0.29	2.00
	98 ≤ C < 100	<i>Equus caballus</i>	272	0.91	0.02	38.86
	98 ≤ C ≤ 100	<i>Equus caballus</i>	3950	0.91	0.02	37.98
	C = 100	<i>Equus caballus</i>	3678	0.90	0.02	37.92
N1	C < 90	<i>Theileria cervi</i>	693	0.49	0.11	4.44
	90 ≤ C < 92	<i>Mammuthus primigenius</i>	17	0.94	0.06	17.00
	92 ≤ C < 94	<i>Mammuthus primigenius</i>	49	0.89	0.07	12.25
	94 ≤ C < 96	<i>Mammuthus primigenius</i>	161	0.88	0.04	20.13
	96 ≤ C < 98	<i>Mammuthus primigenius</i>	275	0.47	0.43	1.10
	98 ≤ C < 100	<i>Mammuthus primigenius</i>	319	0.84	0.04	18.76
	98 ≤ C ≤ 100	<i>Mammuthus primigenius</i>	8444	0.85	0.06	15.00
	C = 100	<i>Mammuthus primigenius</i>	8125	0.86	0.06	14.88

N2	$C < 90$	<i>Mammuthus primigenius</i>	40	0.37	0.13	2.86
	$90 \leq C < 92$	<i>Stenopirates sp.</i>	12	0.48	0.16	3.00
	$92 \leq C < 94$	<i>Mammuthus primigenius</i>	23	0.42	0.27	1.53
	$94 \leq C < 96$	<i>Mammuthus primigenius</i>	35	0.61	0.26	2.33
	$96 \leq C < 98$	<i>Mammuthus primigenius</i>	57	0.65	0.23	2.85
	$98 \leq C < 100$	<i>Mammuthus primigenius</i>	179	0.76	0.06	12.79
	$98 \leq C \leq 100$	<i>Mammuthus primigenius</i>	4169	0.82	0.05	17.59
	$C = 100$	<i>Mammuthus primigenius</i>	3990	0.82	0.05	17.89
N3	$C < 90$	<i>Mammuthus primigenius</i>	174	0.65	0.07	9.67
	$90 \leq C < 92$	<i>Homo sapiens</i>	194	0.66	0.27	2.46
	$92 \leq C < 94$	<i>Mammuthus primigenius</i>	99	0.77	0.08	9.90
	$94 \leq C < 96$	<i>Mammuthus primigenius</i>	122	0.77	0.08	10.17
	$96 \leq C < 98$	<i>Mammuthus primigenius</i>	737	0.90	0.04	25.41
	$98 \leq C < 100$	<i>Mammuthus primigenius</i>	672	0.88	0.05	16.00
	$98 \leq C \leq 100$	<i>Mammuthus primigenius</i>	16998	0.83	0.05	17.89
	$C = 100$	<i>Mammuthus primigenius</i>	16326	0.83	0.05	17.98
N4	$C < 90$	<i>Theileria cervi</i>	27	0.28	0.04	6.75
	$90 \leq C < 92$	<i>Mammuthus primigenius</i>	34	0.67	0.12	5.67
	$92 \leq C < 94$	<i>Mammuthus primigenius</i>	38	0.95	0.05	19.00
	$94 \leq C < 96$	<i>Reclinomonas americana</i>	9	0.41	0.18	2.25
	$96 \leq C < 98$	<i>Mammuthus primigenius</i>	57	0.75	0.08	9.50
	$98 \leq C < 100$	<i>Mammuthus primigenius</i>	20	0.69	0.10	6.67
	$98 \leq C \leq 100$	<i>Mammuthus primigenius</i>	673	0.76	0.09	8.63
	$C = 100$	<i>Mammuthus primigenius</i>	653	0.76	0.09	8.37
N5	$C < 90$	<i>Andalucia godoyi</i>	32	0.24	0.18	1.33
	$90 \leq C < 92$	<i>Reclinomonas americana</i>	12	0.55	0.14	4.00
	$92 \leq C < 94$	<i>Reclinomonas americana</i>	6	0.50	0.33	1.50
	$94 \leq C < 96$	<i>Mammuthus primigenius</i>	21	0.95	0.05	21.00
	$96 \leq C < 98$	<i>Mammuthus primigenius</i>	76	0.84	0.06	15.20

	$98 \leq C < 100$	<i>Mammuthus primigenius</i>	141	0.90	0.04	23.50
	$98 \leq C \leq 100$	<i>Mammuthus primigenius</i>	2645	0.86	0.05	18.12
	$C = 100$	<i>Mammuthus primigenius</i>	2504	0.85	0.05	17.89
N6	$C < 90$	<i>Theileria cervi</i>	117	0.29	0.22	1.31
	$90 \leq C < 92$	<i>Adoxophyes honmai</i>	1	0.50	0.50	1.00
	$92 \leq C < 94$	<i>Mammuthus primigenius</i>	108	0.69	0.06	12.00
	$94 \leq C < 96$	<i>Mammuthus primigenius</i>	85	0.89	0.03	28.33
	$96 \leq C < 98$	<i>Mammuthus primigenius</i>	400	0.90	0.05	20.00
	$98 \leq C < 100$	<i>Mammuthus primigenius</i>	511	0.88	0.05	16.48
	$98 \leq C \leq 100$	<i>Mammuthus primigenius</i>	10550	0.82	0.05	16.91
	$C = 100$	<i>Mammuthus primigenius</i>	10039	0.82	0.05	16.93
JK2911	< 90	<i>Homo sapiens</i>	30452	1.00	0.00	342.16
	$\geq 90-92$	<i>Homo sapiens</i>	46335	1.00	0.00	46335.00
	$\geq 92-94$	<i>Homo sapiens</i>	143309	1.00	0.00	1592.32
	$\geq 94-96$	<i>Homo sapiens</i>	480195	1.00	0.00	2609.76
	$\geq 96-98$	<i>Homo sapiens</i>	1285504	1.00	0.00	4479.11
	$\geq 98-100$	<i>Homo sapiens</i>	2129591	1.00	0.00	1964.57
	≥ 98	<i>Homo sapiens</i>	30024129	1.00	0.00	3284.20
	100	<i>Homo sapiens</i>	27894633	1.00	0.00	3461.73
Afontova-Gora3	< 90	<i>Homo sapiens</i>	3685	1.00	0.00	1842.50
	$\geq 90-92$	<i>Homo sapiens</i>	11268	1.00	0.00	11268.00
	$\geq 92-94$	<i>Homo sapiens</i>	26312	1.00	0.00	26312.00
	$\geq 94-96$	<i>Homo sapiens</i>	86303	1.00	0.00	43151.50
	$\geq 96-98$	<i>Homo sapiens</i>	209270	1.00	0.00	1609.77
	$\geq 98-100$	<i>Homo sapiens</i>	281458	1.00	0.00	8041.66
	≥ 98	<i>Homo sapiens</i>	332193	1.00	0.00	2460.69
	100	<i>Homo sapiens</i>	50735	1.00	0.00	507.35
Villabruna	< 90	<i>Homo sapiens</i>	1000	0.97	0.02	55.56
	$\geq 90-92$	<i>Homo sapiens</i>	1256	1.00	0.00	1256.00
	$\geq 92-94$	<i>Homo sapiens</i>	3002	1.00	0.00	3002.00
	$\geq 94-96$	<i>Homo sapiens</i>	7263	1.00	0.00	7263.00
	$\geq 96-98$	<i>Homo sapiens</i>	11837	1.00	0.00	5918.50
	$\geq 98-100$	<i>Homo sapiens</i>	17228	1.00	0.00	17228.00
	≥ 98	<i>Homo sapiens</i>	193260	1.00	0.00	743.31
	100	<i>Homo sapiens</i>	176032	1.00	0.00	677.05

‡ The similarity we used here is 98%.

Table S8. Analysis of One-Way ANOVA with LSD for VMH of different query coverage by use of whole animal mtDNA database based on BLAST search

Query Coverage (C, %)		Mean difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound
C < 90	C≥90-92	133.50000	3035.67056	.965	-5984.4920	6251.4920
	C≥92-94	82.87500	2628.96782	.975	-5215.4615	5381.2115
	C≥94-96	98.50000	2628.96782	.970	-5199.8365	5396.8365
	C≥96-98	-18.13889	2579.82391	.994	-5217.4323	5181.1546
	C≥98-100	-57.80556	2579.82391	.982	-5257.0990	5141.4879
	C=100	-9950.58333*	2579.82391	.000	-15149.8768	-4751.2899
C ≥ 90-92	C<90	-133.50000	3035.67056	.965	-6251.4920	5984.4920
	C≥92-94	-50.62500	2628.96782	.985	-5348.9615	5247.7115
	C≥94-96	-35.00000	2628.96782	.989	-5333.3365	5263.3365
	C≥96-98	-151.63889	2579.82391	.953	-5350.9323	5047.6546
	C≥98-100	-191.30556	2579.82391	.941	-5390.5990	5007.9879
	C=100	-10084.08333*	2579.82391	.000	-15283.3768	-4884.7899
C ≥ 92-94	C<90	-82.87500	2628.96782	.975	-5381.2115	5215.4615
	C≥90-92	50.62500	2628.96782	.985	-5247.7115	5348.9615
	C≥94-96	15.62500	2146.54324	.994	-4310.4486	4341.6986
	C≥96-98	-101.01389	2086.06506	.962	-4305.2018	4103.1740
	C≥98-100	-140.68056	2086.06506	.947	-4344.8684	4063.5073
	C=100	-10033.45833*	2086.06506	.000	-14237.6462	-5829.2704
C ≥ 94-96	C<90	-98.50000	2628.96782	.970	-5396.8365	5199.8365
	C≥90-92	35.00000	2628.96782	.989	-5263.3365	5333.3365
	C≥92-94	-15.62500	2146.54324	.994	-4341.6986	4310.4486
	C≥96-98	-116.63889	2086.06506	.956	-4320.8268	4087.5490
	C≥98-100	-156.30556	2086.06506	.941	-4360.4934	4047.8823
	C=100	-10049.08333*	2086.06506	.000	-14253.2712	-5844.8954
C ≥ 96-98	C<90	18.13889	2579.82391	.994	-5181.1546	5217.4323
	C≥90-92	151.63889	2579.82391	.953	-5047.6546	5350.9323
	C≥92-94	101.01389	2086.06506	.962	-4103.1740	4305.2018
	C≥94-96	116.63889	2086.06506	.956	-4087.5490	4320.8268
	C≥98-100	-39.66667	2023.78037	.984	-4118.3280	4038.9947
	C=100	-9932.44444*	2023.78037	.000	-14011.1058	-5853.7831
C ≥ 98-100	C<90	57.80556	2579.82391	.982	-5141.4879	5257.0990
	C≥90-92	191.30556	2579.82391	.941	-5007.9879	5390.5990
	C≥92-94	140.68056	2086.06506	.947	-4063.5073	4344.8684
	C≥94-96	156.30556	2086.06506	.941	-4047.8823	4360.4934
	C≥96-98	39.66667	2023.78037	.984	-4038.9947	4118.3280
	C=100	-9892.77778*	2023.78037	.000	-13971.4391	-5814.1164
	C<90	9950.58333*	2579.82391	.000	4751.2899	15149.8768

C = 100	C≥90-92	10084.08333*	2579.82391	.000	4884.7899	15283.3768
	C≥92-94	10033.45833*	2086.06506	.000	5829.2704	14237.6462
	C≥94-96	10049.08333*	2086.06506	.000	5844.8954	14253.2712
	C≥96-98	9932.44444*	2023.78037	.000	5853.7831	14011.1058
	C≥98-100	9892.77778*	2023.78037	.000	5814.1164	13971.4391

‡ The mean difference is significant at the 0.05 level.

Table S9. Testing of the best method and parameters for ancient mammal species identification using 152 ancient samples

Samples	Similarity Ls (%)	SR	VMH	PoVMH (%)	R	Run
horse1	98 ≤ L < 100	<i>Equus caballus</i>	123383	0.917134	38.69019	ERR3223781
		<i>Equus przewalskii</i>	3189	0.023705		
horse2	98 ≤ L < 100	<i>Equus caballus</i>	2E+06	0.950806	38.60584	ERR3223830
		<i>Equus przewalskii</i>	49386	0.024629		
horse3	98 ≤ L < 100	<i>Equus caballus</i>	16653	0.920818	36.20217	ERR3223780
		<i>Equus przewalskii</i>	460	0.025435		
horse4	98 ≤ L < 100	<i>Equus caballus</i>	5E+06	0.956522	37.67438	ERR3223822
		<i>Equus przewalskii</i>	121935	0.025389		
horse5	98 ≤ L < 100	<i>Equus caballus</i>	121935	0.939086	32.78285	ERR3223877
		<i>Equus przewalskii</i>	121935	0.028646		
horse6	98 ≤ L < 100	<i>Equus caballus</i>	121935	0.939019	55.35135	ERR3225461
		<i>Equus przewalskii</i>	121935	0.016965		
horse7	98 ≤ L < 100	<i>Equus caballus</i>	121935	0.947222	39.15539	ERR3225565
		<i>Equus przewalskii</i>	121935	0.024191		
horse8	98 ≤ L < 100	<i>Equus caballus</i>	121935	0.955995	40.10522	ERR3225463
		<i>Equus przewalskii</i>	121935	0.023837		
horse9	98 ≤ L < 100	<i>Equus caballus</i>	121935	0.955476	41.36269	ERR3225477
		<i>Equus przewalskii</i>	121935	0.0231		
horse10	98 ≤ L < 100	<i>Equus caballus</i>	121935	0.953546	39.52482	ERR3225561
		<i>Equus przewalskii</i>	121935	0.024125		
horse11	98 ≤ L < 100	<i>Equus caballus</i>	121935	0.958523	42.39734	ERR3225458
		<i>Equus przewalskii</i>	121935	0.022608		
horse12	98 ≤ L < 100	<i>Equus caballus</i>	121935	0.9522	38.88561	ERR3225476
		<i>Equus przewalskii</i>	121935	0.024487		
horse13	98 ≤ L < 100	<i>Equus caballus</i>	121935	0.948373	39.85849	ERR3225491

		<i>Equus przewalskii</i>	121935	0.023793		
horse14	98 ≤ L < 100	<i>Equus caballus</i>	121935	0.956401	33.98592	ERR3225537
		<i>Equus przewalskii</i>	121935	0.028141		
horse15	98 ≤ L < 100	<i>Equus caballus</i>	121935	0.948718	40.80882	ERR3225545
		<i>Equus przewalskii</i>	121935	0.023248		
horse16	98 ≤ L < 100	<i>Equus caballus</i>	121935	0.941415	33.18182	ERR3225606
		<i>Equus przewalskii</i>	121935	0.028371		
horse17	98 ≤ L < 100	<i>Equus caballus</i>	121935	0.9637	41.20896	ERR3225488
		<i>Equus przewalskii</i>	121935	0.023386		
horse18	98 ≤ L < 100	<i>Equus caballus</i>	121935	0.932295	36.18605	ERR3225542
		<i>Equus przewalskii</i>	121935	0.025764		
horse19	98 ≤ L < 100	<i>Equus caballus</i>	121935	0.943377	46.15	ERR3225599
		<i>Equus przewalskii</i>	121935	0.020442		
horse20	98 ≤ L < 100	<i>Equus caballus</i>	121935	0.950538	34.3301	ERR3225462
		<i>Equus przewalskii</i>	121935	0.027688		
horse21	98 ≤ L < 100	<i>Equus caballus</i>	121935	0.951361	44.35776	ERR3225492
		<i>Equus przewalskii</i>	121935	0.021447		
horse22	98 ≤ L < 100	<i>Equus caballus</i>	121935	0.941972	35.57447	ERR3225585
		<i>Equus przewalskii</i>	121935	0.026479		
horse23	98 ≤ L < 100	<i>Equus caballus</i>	121935	0.952488	36.9808	ERR3225596
		<i>Equus przewalskii</i>	121935	0.025756		
horse24	98 ≤ L < 100	<i>Equus caballus</i>	121935	0.93993	36.47853	ERR3225475
		<i>Equus przewalskii</i>	121935	0.025767		
horse25	98 ≤ L < 100	<i>Equus caballus</i>	121935	0.950752	31.08475	ERR3225577
		<i>Equus przewalskii</i>	121935	0.030586		
horse26	98 ≤ L < 100	<i>Equus caballus</i>	121935	0.954054	47.9375	ERR3225592
		<i>Equus przewalskii</i>	121935	0.019902		
horse27	98 ≤ L < 100	<i>Equus caballus</i>	121935	0.953944	41.18857	ERR3225605
		<i>Equus przewalskii</i>	121935	0.02316		
horse28	98 ≤ L < 100	<i>Equus caballus</i>	121935	0.963466	51.27778	ERR3225551
		<i>Equus przewalskii</i>	121935	0.018789		
horse29	98 ≤ L < 100	<i>Equus caballus</i>	121935	0.953433	37.07345	ERR3225555
		<i>Equus przewalskii</i>	121935	0.025717		
horse30	98 ≤ L < 100	<i>Equus caballus</i>	121935	0.95687	40.23715	ERR3225560
		<i>Equus przewalskii</i>	121935	0.023781		
horse31	98 ≤ L < 100	<i>Equus caballus</i>	121935	0.950773	41.85672	ERR3225478

		<i>Equus przewalskii</i>	121935	0.022715		
horse32	98 ≤ L < 100	<i>Equus caballus</i>	121935	0.948468	45.30591	ERR3225536
		<i>Equus przewalskii</i>	121935	0.020935		
horse33	98 ≤ L < 100	<i>Equus caballus</i>	121935	0.965977	49.87838	ERR3225538
		<i>Equus przewalskii</i>	121935	0.019367		
horse34	98 ≤ L < 100	<i>Equus caballus</i>	121935	0.942813	36.75501	ERR3225589
		<i>Equus przewalskii</i>	121935	0.025651		
horse35	98 ≤ L < 100	<i>Equus caballus</i>	121935	0.949457	36.99926	ERR3225493
		<i>Equus przewalskii</i>	121935	0.025662		
horse36	98 ≤ L < 100	<i>Equus caballus</i>	121935	0.951002	41.09497	ERR3225604
		<i>Equus przewalskii</i>	121935	0.023142		
horse37	98 ≤ L < 100	<i>Equus caballus</i>	121935	0.942701	47.9917	ERR3225608
		<i>Equus przewalskii</i>	121935	0.019643		
horse38	98 ≤ L < 100	<i>Equus caballus</i>	121935	0.945722	37.20615	ERR3225479
		<i>Equus przewalskii</i>	121935	0.025418		
horse39	98 ≤ L < 100	<i>Equus caballus</i>	121935	0.887955	39.01538	ERR3225612
		<i>Equus przewalskii</i>	121935	0.022759		
horse40	98 ≤ L < 100	<i>Equus caballus</i>	121935	0.941393	34.4908	ERR3225662
		<i>Equus przewalskii</i>	121935	0.027294		
horse41	98 ≤ L < 100	<i>Equus caballus</i>	121935	0.942593	40.76552	ERR3225464
		<i>Equus przewalskii</i>	121935	0.023122		
horse42	98 ≤ L < 100	<i>Equus caballus</i>	121935	0.958932	42.64319	ERR3225573
		<i>Equus przewalskii</i>	121935	0.022487		
horse43	98 ≤ L < 100	<i>Equus caballus</i>	121935	0.955928	38.66098	ERR3225613
		<i>Equus przewalskii</i>	121935	0.024726		
horse44	98 ≤ L < 100	<i>Equus caballus</i>	121935	0.947002	33.70297	ERR3225518
		<i>Equus przewalskii</i>	121935	0.028098		
horse45	98 ≤ L < 100	<i>Equus caballus</i>	121935	0.959322	47.50628	ERR3225591
		<i>Equus przewalskii</i>	121935	0.020194		
horse46	98 ≤ L < 100	<i>Equus caballus</i>	121935	0.952703	54.3229	ERR3225597
		<i>Equus przewalskii</i>	121935	0.017538		
horse47	98 ≤ L < 100	<i>Equus caballus</i>	121935	0.923412	40.08108	ERR3225519
		<i>Equus przewalskii</i>	121935	0.023039		
horse48	98 ≤ L < 100	<i>Equus caballus</i>	121935	0.933681	34.97778	ERR3225480
		<i>Equus przewalskii</i>	121935	0.026694		
horse49	98 ≤ L < 100	<i>Equus caballus</i>	121935	0.947834	46.45283	ERR3225587

		<i>Equus przewalskii</i>	121935	0.020404		
horse50	98 ≤ L < 100	<i>Equus caballus</i>	121935	0.956725	38.54217	ERR3225557
		<i>Equus przewalskii</i>	121935	0.024823		
horse51	98 ≤ L < 100	<i>Equus caballus</i>	121935	0.922841	49.25455	ERR3225556
		<i>Equus przewalskii</i>	121935	0.018736		
horse52	98 ≤ L < 100	<i>Equus caballus</i>	121935	0.958762	41.48212	ERR3225455
		<i>Equus przewalskii</i>	121935	0.023113		
horse53	98 ≤ L < 100	<i>Equus caballus</i>	121935	0.942821	47.0625	ERR3225588
		<i>Equus przewalskii</i>	121935	0.020033		
horse54	98 ≤ L < 100	<i>Equus caballus</i>	121935	0.885076	38.43103	ERR3225582
		<i>Equus przewalskii</i>	121935	0.02303		
horse55	98 ≤ L < 100	<i>Equus caballus</i>	121935	0.913616	37.64407	ERR3225670
		<i>Equus przewalskii</i>	121935	0.02427		
horse56	98 ≤ L < 100	<i>Equus caballus</i>	121935	0.937152	39.26667	ERR3225564
		<i>Equus przewalskii</i>	121935	0.023866		
horse57	98 ≤ L < 100	<i>Equus caballus</i>	121935	0.921265	36.13924	ERR3225514
		<i>Equus przewalskii</i>	121935	0.025492		
horse58	98 ≤ L < 100	<i>Equus caballus</i>	121935	0.944616	42.63978	ERR3225611
		<i>Equus przewalskii</i>	121935	0.022153		
horse59	98 ≤ L < 100	<i>Equus caballus</i>	121935	0.967521	41.0255	ERR3225626
		<i>Equus przewalskii</i>	121935	0.023583		
horse60	98 ≤ L < 100	<i>Equus caballus</i>	121935	0.971975	43.6	ERR3225506
		<i>Equus przewalskii</i>	121935	0.022293		
horse61	98 ≤ L < 100	<i>Equus caballus</i>	121935	0.933896	39.26939	ERR3225607
		<i>Equus przewalskii</i>	121935	0.023782		
horse62	98 ≤ L < 100	<i>Equus caballus</i>	121935	0.969697	35.2	ERR3225505
		<i>Equus przewalskii</i>	121935	0.027548		
horse63	98 ≤ L < 100	<i>Equus caballus</i>	121935	0.967379	34.4	ERR3225454
		<i>Equus przewalskii</i>	121935	0.028121		
horse64	98 ≤ L < 100	<i>Equus caballus</i>	121935	0.939493	41.70219	ERR3225457
		<i>Equus przewalskii</i>	121935	0.022529		
horse65	98 ≤ L < 100	<i>Equus caballus</i>	121935	0.669643	6.617647	ERR3225598
		<i>Equus zebra</i>	121935	0.10119		
horse66	98 ≤ L < 100	<i>Equus caballus</i>	121935	0.979681	54.06061	ERR3225633
		<i>Equus przewalskii</i>	121935	0.018122		
horse67	98 ≤ L < 100	<i>Equus caballus</i>	121935	0.973235	45.89634	ERR3225540

		<i>Equus przewalskii</i>	121935	0.021205		
horse68	98≤L<100	<i>Equus caballus</i>	121935	0.982582	69.40404	ERR3225548
		<i>Equus przewalskii</i>	121935	0.014157		
horse69	98≤L<100	<i>Equus caballus</i>	121935	0.96556	40.25641	ERR3225502
		<i>Equus przewalskii</i>	121935	0.023985		
horse70	98≤L<100	<i>Equus caballus</i>	121935	0.964373	30.78431	ERR3225507
		<i>Equus przewalskii</i>	121935	0.031327		
horse71	98≤L<100	<i>Equus caballus</i>	121935	0.970729	33.71667	ERR3225513
		<i>Equus przewalskii</i>	121935	0.028791		
horse72	98≤L<100	<i>Equus caballus</i>	121935	0.973656	42	ERR3225494
		<i>Equus przewalskii</i>	121935	0.023182		
horse73	98≤L<100	<i>Equus caballus</i>	121935	0.970185	36.48485	ERR3225583
		<i>Equus przewalskii</i>	121935	0.026591		
horse74	98≤L<100	<i>Equus caballus</i>	121935	0.976619	49.04516	ERR3225486
		<i>Equus przewalskii</i>	121935	0.019913		
horse75	98≤L<100	<i>Equus caballus</i>	121935	0.97593	42.88462	ERR3225495
		<i>Equus przewalskii</i>	121935	0.022757		
horse76	98≤L<100	<i>Equus caballus</i>	121935	0.949099	26.32353	ERR3225584
		<i>Equus przewalskii</i>	121935	0.036055		
horse77	98≤L<100	<i>Equus caballus</i>	121935	0.974083	48.15625	ERR3225610
		<i>Equus przewalskii</i>	121935	0.020228		
horse78	98≤L<100	<i>Equus caballus</i>	121935	0.963428	33.30189	ERR3225627
		<i>Equus przewalskii</i>	121935	0.02893		
horse79	98≤L<100	<i>Equus caballus</i>	121935	0.980193	59.52293	ERR3225594
		<i>Equus przewalskii</i>	121935	0.016467		
horse80	98≤L<100	<i>Equus caballus</i>	121935	0.974407	46.23214	ERR3225509
		<i>Equus przewalskii</i>	121935	0.021076		
horse81	98≤L<100	<i>Equus caballus</i>	121935	0.960679	27.5641	ERR3225569
		<i>Equus przewalskii</i>	121935	0.034853		
horse82	98≤L<100	<i>Equus caballus</i>	121935	0.971541	42.12766	ERR3225516
		<i>Equus przewalskii</i>	121935	0.023062		
horse83	98≤L<100	<i>Equus caballus</i>	121935	0.983387	73.34783	ERR3225510
		<i>Equus przewalskii</i>	121935	0.013407		
horse84	98≤L<100	<i>Equus caballus</i>	121935	0.913325	29.72892	ERR3225547
		<i>Equus przewalskii</i>	121935	0.030722		
horse85	98≤L<100	<i>Equus zebra</i>	121935	0.404255	1.583333	ERR3225609

		<i>Equus kiang</i>	121935	0.255319		
horse86	98≤L<100	<i>Equus caballus</i>	121935	0.96951	39.8481	ERR3225512
		<i>Equus przewalskii</i>	121935	0.02433		
horse87	98≤L<100	<i>Equus caballus</i>	121935	0.527027	2.785714	ERR3225664
		<i>Equus grevyi</i>	121935	0.189189		
horse88	98≤L<100	<i>Equus caballus</i>	121935	0.974063	51.21212	ERR3225517
		<i>Equus przewalskii</i>	121935	0.01902		
horse89	98≤L<100	<i>Equus caballus</i>	121935	0.972337	55.13725	ERR3225496
		<i>Equus przewalskii</i>	121935	0.017635		
horse90	98≤L<100	<i>Equus caballus</i>	121935	0.975751	44.64063	ERR3225624
		<i>Equus przewalskii</i>	121935	0.021858		
horse91	98≤L<100	<i>Equus caballus</i>	121935	0.974301	41.55769	ERR3225469
		<i>Equus przewalskii</i>	121935	0.023445		
horse92	98≤L<100	<i>Equus caballus</i>	121935	0.972828	41.58385	ERR3225566
		<i>Equus przewalskii</i>	121935	0.023394		
horse93	98≤L<100	<i>Equus caballus</i>	121935	0.970827	38	ERR3225546
		<i>Equus przewalskii</i>	121935	0.025548		
horse94	98≤L<100	<i>Equus caballus</i>	121935	0.974314	43.02466	ERR3225456
		<i>Equus przewalskii</i>	121935	0.022645		
horse95	98≤L<100	<i>Equus caballus</i>	121935	0.973563	40.84874	ERR3225525
		<i>Equus przewalskii</i>	121935	0.023833		
horse96	98≤L<100	<i>Equus caballus</i>	121935	0.975671	52.24036	ERR3225603
		<i>Equus przewalskii</i>	121935	0.018677		
horse97	98≤L<100	<i>Equus caballus</i>	121935	0.973665	51.94937	ERR3225576
		<i>Equus przewalskii</i>	121935	0.018743		
horse98	98≤L<100	<i>Equus caballus</i>	121935	0.971831	37.2973	ERR3225641
		<i>Equus przewalskii</i>	121935	0.026056		
horse99	98≤L<100	<i>Equus caballus</i>	121935	0.966654	40.58462	ERR3225497
		<i>Equus przewalskii</i>	121935	0.023818		
horse100	98≤L<100	<i>Equus caballus</i>	121935	0.977944	53.65	ERR3225524
		<i>Equus przewalskii</i>	121935	0.018228		
horse101	98≤L<100	<i>Equus caballus</i>	121935	0.978283	60.53125	ERR3225642
		<i>Equus przewalskii</i>	121935	0.016162		
horse102	98≤L<100	<i>Equus caballus</i>	121935	0.963604	35.01613	ERR3225661
		<i>Equus przewalskii</i>	121935	0.027519		
horse103	98≤L<100	<i>Equus caballus</i>	121935	0.938462	33.88889	ERR3225472

		<i>Equus przewalskii</i>	121935	0.027692		
horse104	98≤L<100	<i>Equus caballus</i>	121935	0.971989	39.65768	ERR3225471
		<i>Equus przewalskii</i>	121935	0.024509		
horse105	98≤L<100	<i>Equus caballus</i>	121935	0.975482	45.92967	ERR3225595
		<i>Equus przewalskii</i>	121935	0.021239		
horse106	98≤L<100	<i>Equus caballus</i>	121935	0.97333	43.72277	ERR3225659
		<i>Equus przewalskii</i>	121935	0.022261		
horse107	98≤L<100	<i>Equus caballus</i>	121935	0.973822	44.89655	ERR3225500
		<i>Equus przewalskii</i>	121935	0.02169		
horse108	98≤L<100	<i>Equus caballus</i>	121935	0.955862	49.5	ERR3225550
		<i>Equus przewalskii</i>	121935	0.01931		
horse109	98≤L<100	<i>Equus caballus</i>	121935	0.963523	30.34122	ERR3225470
		<i>Equus przewalskii</i>	121935	0.031756		
horse110	98≤L<100	<i>Equus caballus</i>	121935	0.971165	42.37097	ERR3225638
		<i>Equus przewalskii</i>	121935	0.022921		
horse111	98≤L<100	<i>Equus caballus</i>	121935	0.974638	44.30588	ERR3225663
		<i>Equus przewalskii</i>	121935	0.021998		
horse112	98≤L<100	<i>Equus caballus</i>	121935	0.971219	43.22472	ERR3225644
		<i>Equus przewalskii</i>	121935	0.022469		
horse113	98≤L<100	<i>Equus caballus</i>	121935	0.970324	38.91	ERR3225616
		<i>Equus przewalskii</i>	121935	0.024938		
horse114	98≤L<100	<i>Equus caballus</i>	121935	0.964448	37.36478	ERR3225473
		<i>Equus przewalskii</i>	121935	0.025812		
horse115	98≤L<100	<i>Equus caballus</i>	121935	0.950813	25.13	ERR3225498
		<i>Equus przewalskii</i>	121935	0.037836		
horse116	98≤L<100	<i>Equus caballus</i>	121935	0.954993	27.83663	ERR3225634
		<i>Equus przewalskii</i>	121935	0.034307		
horse117	98≤L<100	<i>Equus caballus</i>	121935	0.95374	22.53488	ERR3225511
		<i>Equus przewalskii</i>	121935	0.042323		
horse118	98≤L<100	<i>Equus caballus</i>	121935	0.950094	24.11429	ERR3225653
		<i>Equus przewalskii</i>	121935	0.0394		
horse119	98≤L<100	<i>Equus caballus</i>	121935	0.906604	39.22449	ERR3225520
		<i>Equus przewalskii</i>	121935	0.023113		
horse120	98≤L<100	<i>Equus caballus</i>	121935	0.925538	35.04639	ERR3225521
		<i>Equus przewalskii</i>	121935	0.026409		
horse121	98≤L<100	<i>Equus caballus</i>	121935	0.960063	28.60882	ERR3225529

		<i>Equus przewalskii</i>	121935	0.033558		
horse122	98≤L<100	<i>Equus caballus</i>	121935	0.965073	33.81853	ERR3225487
		<i>Equus przewalskii</i>	121935	0.028537		
horse123	98≤L<100	<i>Equus caballus</i>	121935	0.958895	30.72131	ERR3225484
		<i>Equus przewalskii</i>	121935	0.031213		
horse124	98≤L<100	<i>Equus caballus</i>	121935	0.957306	25.93657	ERR3225485
		<i>Equus przewalskii</i>	121935	0.03691		
horse125	98≤L<100	<i>Equus caballus</i>	121935	0.961059	30.75862	ERR3225539
		<i>Equus przewalskii</i>	121935	0.031245		
horse126	98≤L<100	<i>Equus caballus</i>	121935	0.965734	34.50467	ERR3225656
		<i>Equus przewalskii</i>	121935	0.027988		
horse127	98≤L<100	<i>Equus caballus</i>	121935	0.958629	29.13772	ERR3225645
		<i>Equus przewalskii</i>	121935	0.0329		
horse128	98≤L<100	<i>Equus caballus</i>	121935	0.952763	29.09896	ERR3225572
		<i>Equus przewalskii</i>	121935	0.032742		
horse131	98≤L<100	<i>Equus caballus</i>	121935	0.968481	36.23708	ERR3225578
		<i>Equus przewalskii</i>	121935	0.026726		
horse140	98≤L<100	<i>Crocodylus palustris</i>	121935	1	NA	ERR3225575
horse143	98≤L<100	<i>Equus caballus</i>	121935	0.970846	36.22439	ERR3225522
		<i>Equus przewalskii</i>	121935	0.026801		
horse169	98≤L<100	<i>Equus caballus</i>	121935	0.921988	43.12987	ERR3225490
		<i>Equus przewalskii</i>	121935	0.021377		
horse171	98≤L<100	<i>Equus caballus</i>	121935	0.949495	51.27273	ERR3225617
		<i>Equus zebra</i>	121935	0.018519		
horse174	98≤L<100	<i>Equus caballus</i>	121935	0.972859	41.28571	ERR3225614
		<i>Equus przewalskii</i>	121935	0.023564		
horse175	98≤L<100	<i>Equus caballus</i>	121935	0.81407	32.4	ERR3225489
		<i>Equus przewalskii</i>	121935	0.025126		
horse181	98≤L<100	<i>Equus caballus</i>	121935	0.966389	34.4417	ERR3225523
		<i>Equus przewalskii</i>	121935	0.028059		
horse182	98≤L<100	<i>Equus caballus</i>	121935	0.961585	41.78776	ERR3225615
		<i>Equus przewalskii</i>	121935	0.023011		
horse184	98≤L<100	<i>Equus caballus</i>	121935	0.966505	29.07663	ERR3225623
		<i>Equus przewalskii</i>	121935	0.03324		
horse198	98≤L<100	<i>Equus caballus</i>	121935	0.929595	39.42105	ERR3225640
		<i>Equus przewalskii</i>	121935	0.023581		

horse202	98≤L<100	<i>Equus caballus</i>	121935	0.983284	60.51923	ERR3225646
		<i>Equus przewalskii</i>	121935	0.016247		
horse210	98≤L<100	<i>Equus caballus</i>	121935	0.940439	36.26415	ERR3225601
		<i>Equus przewalskii</i>	121935	0.025933		
horse213	98≤L<100	<i>Equus caballus</i>	121935	0.92644	40.45455	ERR3225602
		<i>Equus przewalskii</i>	121935	0.022901		
horse214	98≤L<100	<i>Sarcophilus harrisii</i>	121935	1	NA	ERR3225532
horse216	98≤L<100	<i>Equus caballus</i>	121935	0.979137	50.31959	ERR3225531
		<i>Equus przewalskii</i>	121935	0.019458		
horse220	98≤L<100	<i>Equus caballus</i>	121935	0.95687	39	ERR3225647
		<i>Equus przewalskii</i>	121935	0.024535		
horse221	98≤L<100	<i>Equus caballus</i>	121935	0.954747	37.54228	ERR3225655
		<i>Equus przewalskii</i>	121935	0.025431		
horse222	98≤L<100	<i>Equus caballus</i>	121935	0.97517	43.22819	ERR3225639
		<i>Equus przewalskii</i>	121935	0.022559		
horse223	98≤L<100	<i>Equus caballus</i>	121935	0.965234	45.82764	ERR3225600
		<i>Equus przewalskii</i>	121935	0.021062		
horse226	98≤L<100	<i>Equus caballus</i>	121935	0.949118	43.42945	ERR3225618
		<i>Equus przewalskii</i>	121935	0.021854		
Ancient panda	98≤L<100	<i>Ailuropoda melanoleuca</i>	121935	0.34981	1.268966	
		<i>Ursus arctos</i>	121935	0.275665		
Ancient pig	98≤L<100	<i>Sus scrofa</i>	121935	0.574132	5.2	
		<i>Osteolaemus tetraspis</i>	121935	0.11041		
Ancient wolf	98≤L<100	<i>Canis lupus</i>	121935	0.989246	453.3571	
		<i>Canis latrans</i>	121935	0.002182		

Table S10. Comparisons of species identification under different screening conditions based on deamination induced C-to-T and/or G-to-A changes

Species	The first and last X bases for screening reads with C-to-T and/or G-to-A changes	The top1 species	VMH	PoVMH of top1 species	PoVMH of secondly ranked species	R
British aurochs	X=5	<i>Bos taurus</i>	662	0.93	0.04	24.52
	X=6	<i>Bos taurus</i>	1,667	0.92	0.05	18.32
	X=7	<i>Bos taurus</i>	2,127	0.91	0.05	19.34
	X=8	<i>Bos taurus</i>	2,583	0.91	0.05	19.87
	X=9	<i>Bos taurus</i>	2,591	0.91	0.05	19.63
	X=10	<i>Bos taurus</i>	3,020	0.92	0.04	20.54
JK2911	X=5	<i>Homo sapiens</i>	462,543	1.00	0.00	5027.63
	X=6	<i>Homo sapiens</i>	912,064	1.00	0.00	5011.34
	X=7	<i>Homo sapiens</i>	1,303,589	1.00	0.00	3325.48
	X=8	<i>Homo sapiens</i>	1,671,700	1.00	0.00	2026.30
	X=9	<i>Homo sapiens</i>	2,009,828	1.00	0.00	1792.89
	X=10	<i>Homo sapiens</i>	2,353,972	1.00	0.00	2045.15
Direkli5	X=5	<i>Capra hircus</i>	290	0.55	0.10	5.27
	X=6	<i>Capra hircus</i>	436	0.34	0.33	1.04
	X=7	<i>Capra hircus</i>	617	0.37	0.26	1.47
	X=8	<i>Capra hircus</i>	786	0.36	0.19	1.87
	X=9	<i>Capra hircus</i>	973	0.35	0.18	1.93
	X=10	<i>Capra hircus</i>	1,284	0.37	0.17	2.18
Ancient Horse	X=5	<i>Reclinomonas americana</i>	3	0.33	0.33	1.00
	X=6	<i>Andalucia godoyi</i>	5	0.31	0.19	1.67
	X=7	<i>Reclinomonas americana</i>	7	0.23	0.19	1.17
	X=8	<i>Equus caballus</i>	78	0.75	0.07	11.14
	X=9	<i>Equus caballus</i>	78	0.72	0.08	8.67
	X=10	<i>Equus caballus</i>	78	0.70	0.11	6.50
Afontova Gora3	X=5	<i>Homo sapiens</i>	33,103	1.00	0.00	848.79
	X=6	<i>Homo sapiens</i>	70,337	1.00	0.00	1803.51
	X=7	<i>Homo sapiens</i>	101,292	1.00	0.00	2597.23
	X=8	<i>Homo sapiens</i>	124,322	1.00	0.00	3108.05
	X=9	<i>Homo sapiens</i>	150,521	1.00	0.00	3671.25
	X=10	<i>Homo sapiens</i>	173,116	1.00	0.00	4222.35
Villabruna	X=5	<i>Homo sapiens</i>	13,816	1.00	0.00	100000.00
	X=6	<i>Homo sapiens</i>	26,693	1.00	0.00	635.55

	X=7	<i>Homo sapiens</i>	35,187	1.00	0.00	837.79
	X=8	<i>Homo sapiens</i>	43,025	1.00	0.00	1024.40
	X=9	<i>Homo sapiens</i>	49,501	1.00	0.00	1178.59
	X=10	<i>Homo sapiens</i>	57,484	1.00	0.00	1368.67
N1	X=5	<i>Mammuthus primigenius</i>	287	0.93	0.04	22.08
	X=6	<i>Mammuthus primigenius</i>	625	0.67	0.27	2.50
	X=7	<i>Mammuthus primigenius</i>	768	0.70	0.23	3.07
	X=8	<i>Mammuthus primigenius</i>	996	0.74	0.19	3.98
	X=9	<i>Mammuthus primigenius</i>	1,240	0.76	0.15	4.96
	X=10	<i>Mammuthus primigenius</i>	1,389	0.78	0.14	5.56
N2	X=5	<i>Mammuthus primigenius</i>	172	0.91	0.04	24.57
	X=6	<i>Mammuthus primigenius</i>	335	0.92	0.04	23.93
	X=7	<i>Mammuthus primigenius</i>	434	0.90	0.04	25.53
	X=8	<i>Mammuthus primigenius</i>	512	0.91	0.03	28.44
	X=9	<i>Mammuthus primigenius</i>	551	0.90	0.03	26.24
	X=10	<i>Mammuthus primigenius</i>	596	0.90	0.03	27.09
N3	X=5	<i>Mammuthus primigenius</i>	467	0.63	0.03	24.58
	X=6	<i>Mammuthus primigenius</i>	981	0.76	0.03	23.93
	X=7	<i>Mammuthus primigenius</i>	1,474	0.80	0.03	23.40
	X=8	<i>Mammuthus primigenius</i>	1,859	0.82	0.04	22.67
	X=9	<i>Mammuthus primigenius</i>	2,435	0.84	0.04	23.19
	X=10	<i>Mammuthus primigenius</i>	2,838	0.85	0.04	23.45
N4	X=5	<i>Mammuthus primigenius</i>	3	0.50	0.33	1.50
	X=6	<i>Mammuthus primigenius</i>	23	0.85	0.07	11.50
	X=7	<i>Mammuthus primigenius</i>	41	0.87	0.04	20.50
	X=8	<i>Mammuthus primigenius</i>	57	0.84	0.06	14.25
	X=9	<i>Mammuthus primigenius</i>	57	0.80	0.06	14.25
	X=10	<i>Mammuthus primigenius</i>	57	0.79	0.06	14.25
N5	X=5	<i>Mammuthus primigenius</i>	70	0.93	0.04	23.33

	X=6	<i>Mammuthus primigenius</i>	123	0.95	0.04	24.60
	X=7	<i>Mammuthus primigenius</i>	192	0.94	0.03	32.00
	X=8	<i>Mammuthus primigenius</i>	283	0.93	0.03	28.30
	X=9	<i>Mammuthus primigenius</i>	338	0.92	0.03	28.17
	X=10	<i>Mammuthus primigenius</i>	355	0.92	0.03	27.31
N6	X=5	<i>Mammuthus primigenius</i>	339	0.95	0.03	28.25
	X=6	<i>Mammuthus primigenius</i>	687	0.94	0.04	24.54
	X=7	<i>Mammuthus primigenius</i>	892	0.94	0.04	24.11
	X=8	<i>Mammuthus primigenius</i>	1,182	0.92	0.04	22.30
	X=9	<i>Mammuthus primigenius</i>	1,387	0.93	0.04	23.51
	X=10	<i>Mammuthus primigenius</i>	1,759	0.93	0.04	24.10



Figure S1. The sampling area of woolly mammoth samples. The dark circle showed the sampling area.

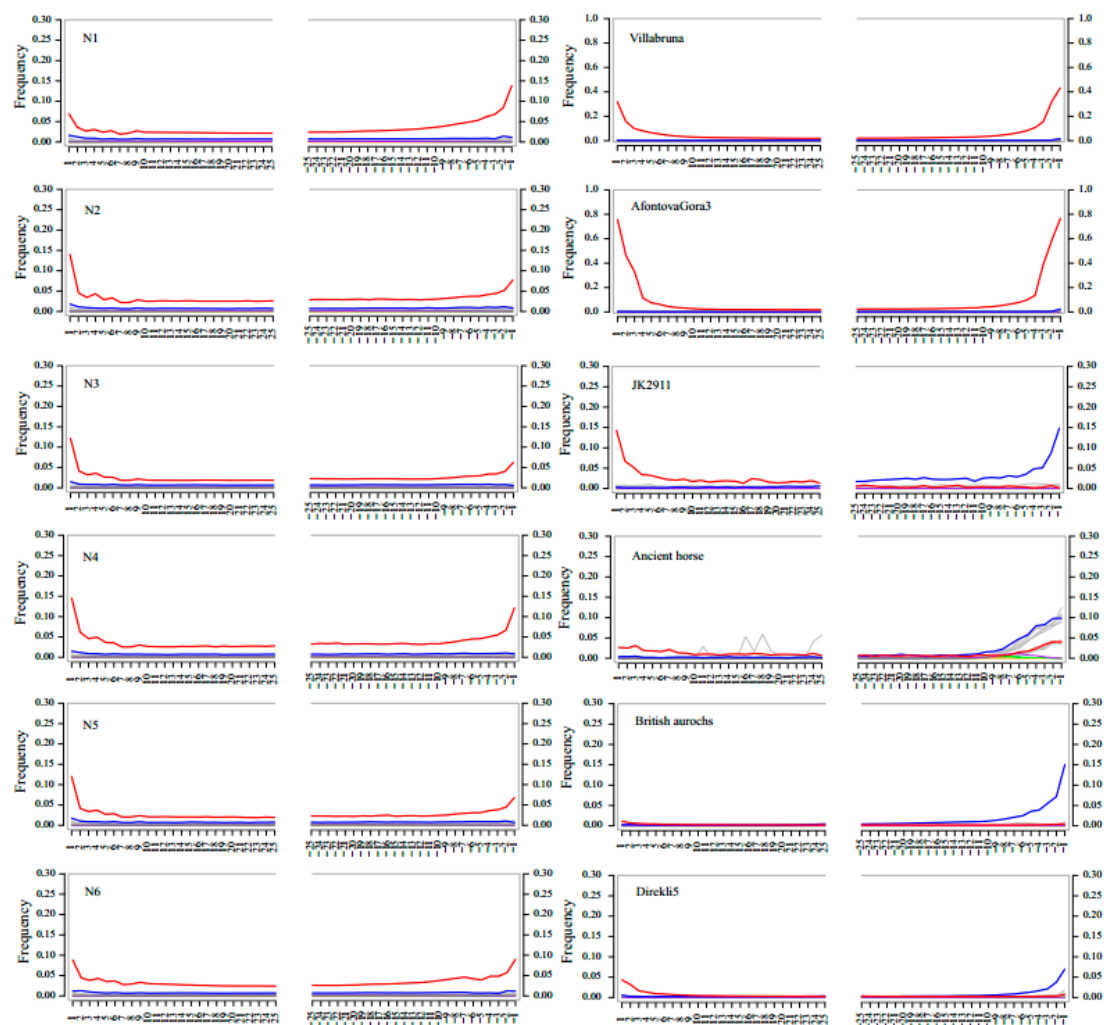


Figure S2. Patterns of cytosine deamination in DNA libraries of 12; samples. The y axis showed the frequencies of nucleotide substitutions, and the x axis showed the distance from 5' and 3' ends. Red: C-to-T. Blue: G-to-A.