

Supplementary Material

for

The evolutionary and phylogeographic history of woolly mammoths: a comprehensive mitogenomic analysis

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Table S1-S4 provide details of all samples used in the different extraction/library preparation schemes. Table S5 provides details of the *strict* and *relaxed* analyses.

Table S1: Samples prepared using method 1, multiplex PCR

| ID | Region | Location | Museum Number | Latitude | Longitude | Radiocarbon Number | 14C date | Sigma | intCal13 Median | Radiocarbon Date Reference | GenBank Acc. |
|-------|--------|----------------------------|---------------|----------|-----------|--------------------|----------|-------|-----------------|----------------------------|--------------|
| 10235 | Russia | Bykovsky Peninsula | MKh-O621 | 73.00 | 128.50 | GIN 10235 | 19200 | 200 | 23138 | Barnes_et al. 2007 | KX176795 |
| 10236 | Russia | Bykovsky Peninsula | MKh-O422 | 71.79 | 129.40 | GIN 10236 | 20200 | 100 | 24269 | Barnes_et al. 2007 | KX176796 |
| 10244 | Russia | Bykovsky Peninsula | Mkh-O433 | 71.79 | 129.40 | GIN 10244 | 30300 | 600 | 34376 | Barnes_et al. 2007 | KX176797 |
| 10247 | Russia | Bykovsky Peninsula | MKh-O429 | 71.79 | 129.40 | GIN 10247 | 28900 | 200 | 33101 | Barnes_et al. 2007 | KX176798 |
| 10261 | Russia | Bykovsky Peninsula | MKh-O533 | 71.79 | 129.40 | GIN 10261 | 34000 | 500 | 38456 | Barnes_et al. 2007 | KX176799 |
| 10264 | Russia | Bykovsky Peninsula | MKh-O381 | 71.79 | 129.40 | GIN 10264 | 24300 | 200 | 28332 | Barnes_et al. 2007 | KX176800 |
| 10643 | Russia | Wrangel Island | ILC.08(10643) | 71.00 | 179.00 | OxA 11841 | 25890 | 140 | 30131 | Barnes_et al. 2007 | KX176750 |
| 10659 | Russia | Bolshoy Lyakhovsk(i)y Isl. | BL-O865 | 73.33 | 141.40 | GIN 10659 | 32500 | 500 | 36571 | Barnes_et al. 2007 | KX176801 |
| 10703 | Russia | Bolshoy Lyakhovsk(i)y Isl. | BL-O585 | 73.34 | 141.31 | GIN 10703 | 40200 | 900 | 43927 | Barnes_et al. 2007 | KX176802 |
| 11028 | Russia | Bolshoy Lyakhovsk(i)y Isl. | ILC.04(11028) | 74.00 | 138.00 | OxA 11748 | 36610 | 360 | 41233 | Barnes_et al. 2007 | KX176803 |

Table S2: Samples prepared using method 2, mitochondrial capture

| ID | Region | Location | Museum Number | Latitude | Longitude | Radiocarbon Number | 14C date | Sigma | intCal13 Median | Radiocarbon Date Reference | GenBank Acc. |
|----------|---------|--|---------------|----------|-----------|------------------------|---------------|-------------|-----------------|----------------------------------|--------------|
| 10643 | Russia | Wrangel Island | ILC.08(10643) | 71.00 | 179.00 | OxA 11841 | 25890 | 140 | 30131 | Barnes_et al. 2007 | KX176750 |
| 10717 | Russia | Bolshoy Lyakhovsk(i)y Isl. | BL-O308 | 73.34 | 141.31 | GIN 10717 | 43600 | 1000 | 47022 | Barnes_et al. 2007 | KX176751 |
| 10719 | Russia | Yakutia, Lena Delta Region | Nag-99-O203 | 72.90 | 123.35 | GIN 10719 | 30200 | 400 | 34261 | Barnes_et al. 2007 | KX176752 |
| AlexKrim | Ukraine | Ermine Bair Khosar, Krim Peninsula | | 44.80 | 34.29 | | | | | | KX176785 |
| SP1021 | Russia | Bykovsky Peninsula | MKh-O438 | 71.79 | 129.40 | GIN 10245 | 29400 | 600 | 33499 | Barnes et al. 2007 | KX176753 |
| SP1022 | Russia | Bykovsky Peninsula | MKh-O435 | 71.79 | 129.40 | CAMS 158460/ GIN 10242 | 12845 | 50 | 15312 | This study | KX176754 |
| SP1144 | Russia | Strashnaya cave, Altai | | 51.08 | 83.03 | CAMS 158463 | 45700 | infinite | | This study | KX176767 |
| SP1145 | Russia | Ust Kanskaya-Cave 4km southeast of village Ust-Kan, on the right bank of the Tcharysh river (Tschrysch river). On the Belyi Kamen (White Stone Mountain), Altai. | | 50.92 | 84.78 | | | | | | KX176768 |
| SP1349 | Russia | Bolshaya Kolopatkaya river, Kolyma Lowland, Yakutia Sakha, Siberia, Russia, Very close to Cherskii, at a small river called Big grouse river. | | 68.733 | 161.383 | KIA 27805 | 42960 | 1750 | 46623 | Roempler et al. 2006 | KX176755 |
| SP1414 | Germany | Siegsdorf, Germany | | 47.82 | 12.64 | OxA-30164/ KIA 14407 | >46200/ 45180 | +1130 /-990 | | Rosendahl et al. 2005 (KIA date) | KX176769 |

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|--------|---------|--|---------------------|-------|---------|-----------------|-----------|--------------|-----------|---------------------|----------|
| SP1419 | Russia | Mamontoviy Klyk, Olenek-Anabar Reg., Siberia | MaK-O101 | 73.61 | 117.13 | CAMS 158459 | 17640 | 80 | 21334 | This study | KX176756 |
| SP1420 | Russia | Oyagossky Yar, Siberia | NS-OgK-O271 | 72.68 | 143.52 | KIA-27803 | 40700 | +2110 /-1670 | 44773 | Rompler et al. 2006 | KX176757 |
| SP1421 | Russia | Bykovsky Peninsula, Siberia | MKh-O468 | 71.81 | 129.35 | KIA-27804 | 28720 | +540/-500 | 32749 | Rompler et al. 2006 | KX176758 |
| SP1422 | Russia | Bolshoy Lyakhovskiy Isl., Siberia | BL-O600-Z | 73.32 | 141.37 | | | | | | KX176759 |
| SP1584 | Russia | Wrangel Island | LabNo 811 | 71.28 | -178.89 | OxA-30170 | 28690 | 290 | 32765 | This study | |
| SP167 | Germany | Herne West, Germany | | 51.54 | 7.20 | | | | | | KX176770 |
| SP1781 | China | Hongqi site near Harbin, river bed, (2nd site), Heilongjiang Province, China | | 45.74 | 126.66 | | | | | | |
| SP1785 | China | Yong an chun site near Harbin, river bed, (1st site), Heilongjiang Province, China | | 45.74 | 126.66 | OxA-30165 | >50200 | | | This study | KX176771 |
| SP2013 | Europe | North Sea | trenched 20/08/2007 | 56.51 | 3.52 | | | | | | KX176772 |
| SP2014 | Europe | North Sea | trenched 28/07/2007 | 56.51 | 3.52 | OxA-30167 | 40100 | 1200 | 43960 | This study | KX176773 |
| SP2015 | Europe | North Sea | trenched 28/08/2007 | 56.51 | 3.52 | OxA-30168 | >44800 | | | This study | KX176774 |
| SP2016 | Europe | North Sea | trenched 28/07/2007 | 56.51 | 3.52 | CAMS 158600 | | | | This study | KX176775 |
| SP2017 | Europe | North Sea | trenched 27/08/2007 | 56.51 | 3.52 | OxA-30169 | >45000 | | | This study | KX176776 |
| SP2218 | Russia | Wrangel Island | DM 13 | 71.28 | -178.89 | | | | | | KX176760 |
| SP2220 | Russia | Lemming River, in the north of the Wrangel Island | | 71.30 | -179.50 | OxA-30171 | 7306 | 36 | 8106 | This study | KX176761 |
| SP2222 | Russia | Wrangel Island | DM 18 | 71.28 | -178.89 | CAMS 158465 | 4115 | 30 | 4641 | This study | KX176762 |
| SP2223 | Russia | Femur Station 10 (left), Wrangel Island | DM 8 | 71.28 | -178.89 | OxA-30172/30173 | 6891/6876 | 35/34 | 7720/7705 | This study | KX176763 |
| SP2225 | Russia | Niesv. River IV, Wrangel Island | DM 32 | 71.28 | -178.89 | OxA-30174 | 6647 | 35 | 7529 | This study | KX176764 |
| SP2283 | Germany | Saulgau, Germany | | 48.01 | 9.50 | HV 25826 | 25025 | 175 | 29068 | This study | KX176777 |

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|--------|---------------|--------------------------------------|----------------|-------|---------|-------------------------|-----------------|-------------|-----------------|--|-----------------------|----------|
| SP2284 | Germany | Schwenningen, Germany | | 48.06 | 8.50 | OxA-30179 | >45400 | | | | This study | KX176778 |
| SP2293 | Belgium | Belgium | L212 | 50.50 | 4.47 | CAMS 158464 | | | | | This study | KX176779 |
| SP2299 | Spain | Spain | AAL/68-59.973 | 40.46 | -3.75 | | | | | | | |
| SP2300 | Spain | Spain | AAL/68-60568-1 | 40.46 | -3.75 | | | | | | | |
| SP2303 | Germany | Dresden-Prohlis, Germany | SaQ204 | 51.00 | 13.79 | OxA-30175 | 26360 | 220 | 30646 | | This study | KX176780 |
| SP2304 | Germany | Dresden, Germany | SaQ431 | 51.05 | 13.74 | OxA-30176 | 20390 | 120 | 24511 | | This study | KX176781 |
| SP2305 | Germany | Pima, Germany | SaQ18 | 50.96 | 13.97 | OxA-30137 | 39000 | 1000 | 43057 | | This study | KX176782 |
| SP2307 | Germany | Gollwitz, Poel Island, Germany | | 54.02 | 11.48 | KIA 35747/ OxA-30177 | 23900/ 25160 | 130/ 210 | 27943/2 9208 | | Sommer & Benecke 2009 | KX176783 |
| SP2308 | Germany | Schieritz/ Lommatzsch, Germany | SaQ746 | 51.20 | 13.39 | OxA-30178 | 27410 | 250 | 31278 | | This study | KX176784 |
| SP2386 | Russia | Malta, Russia | n.a | 52.84 | 103.52 | | | | | | | KX176786 |
| SP2387 | Russia | Malta, Russia | n.a | 52.84 | 103.52 | | | | | | | KX176787 |
| SP2389 | Russia | Malta, Russia | n.a | 52.84 | 103.52 | | | | | | | KX176788 |
| SP2401 | Russia | Kostenki (Kostyonki?) | 32572 (3) | 51.38 | 39.05 | | | | | | | KX176789 |
| SP2402 | Russia | Kostenki | 32572 (4) | 51.38 | 39.05 | | | | | | | |
| SP2411 | Russia | Secrets Cave, M. Ural | 31615 (2) | 59.42 | 57.75 | | | | | | | KX176790 |
| SP2412 | Russia | Secrets Cave, M. Ural | 31615 (3) | 59.42 | 57.75 | | | | | | | KX176791 |
| SP2415 | Russia | Secrets Cave, M. Ural | 31615 (9) | 59.42 | 57.75 | | | | | | | KX176792 |
| SP2416 | Russia | Medvezhiya Cave, N. Ural | 34760 | 62.00 | 58.73 | | | | | | | KX176793 |
| SP2453 | Ukraine | Dnepr River, Ukraine | Collected 1963 | 51.71 | 30.59 | | | | | | | KX176794 |
| SP317 | United States | Alaska | | 64.20 | -149.49 | | | | | | | |
| SP738 | Russia | Lugovskoya, Russia (Lugovskaya ul.?) | | 51.72 | 38.20 | | | | | | | |
| SP739 | Russia | Lugovskoya, Russia | | 51.72 | 38.20 | | | | | | | |
| SP741 | Russia | Shestakova, Russia | | 58.47 | 68.47 | | | | | | | KX176765 |
| SP743 | Russia | Kochegur (near Shestakova, Russia) | | 58.47 | 68.47 | | | | | | | |
| SP744 | Russia | Kochegur (near Shestakova, Russia) | | 58.47 | 68.47 | | | | | | | KX176766 |

Table S3: Published samples from Enk *et al* 2016 (reference 6)

| ID/ Genbank ID | Region | State | Location | Museum Number | Latitude | Longitude | Radiocarbon Number | 14C date | Sigma | intCal13 Median | Radiocarbon Date Reference |
|------------------------|------------------|-------|-----------------------------------|------------------|----------|-----------|--|-------------|-------|--------------------|-------------------------------|
| EEP41 KX02752 | North America | MA | New Bedford Sound | HP2133 | 41.62 | -70.88 | | | | | |
| EEP42 KX027529 | North America | MA | New Bedford Sound | HP2134 | 41.62 | -70.88 | | | | | |
| EEP43 KX027541 | North America | CA | Santa Rosa Island | SBMNH27 | 33.97 | -120.1 | | | | | |
| EID02 JF912200 | North America | AK | Upper Ikpikpuk R., North Slope | IK-99-70 | 70.47 | -154.25 | Beta #264909, Beta Analytic Inc., Miami, FL, USA | 41510 | 480 | 44964 | Enk et al. 2011 |
| EID03 KX027564 | North America | YU | Sulphur Creek | YPC136.0005 | 63.73 | -138.83 | | | | | |
| EID05 KX027567 | North America | YU | Finning | YPC3.0256 | 63.83 | -138.25 | UCIAMS39115 | 28960 | 310 | 33125 | Debruyne et al 2008 |
| EID07 KX027566 | North America | YU | Finning | YPC3.0229 | 63.83 | -138.25 | | | | | |
| EID09 KX027522 | North America | AK | Upper Ikpikpuk R., North Slope | IK-99-235 | 69.37 | -154.67 | CAMS 91803 | 40870 | 820 | 44440 | Debruyne et al 2008 |
| EID10 KX027568 | North America | YU | Hunker Creek | YPC5.0046 | 63.98 | -139.03 | UCIAMS41487 | 22430 | 140 | 26742 | Debruyne et al 2008 |
| EID11 KX027521 | North America | AK | Upper Ikpikpuk R., North Slope | IK-98-1087 | 69.37 | -154.67 | CAMS 91795 | >54000 | | | Debruyne et al 2008 |
| EID13 KX027524 | North America | AK | Upper Ikpikpuk R., North Slope | IK-99-524 | 69.37 | -154.67 | CAMS 91811 | >51000 | | | Debruyne et al 2008 |
| EID15 KX027556 | North America | WY | nd | UW20579 | 43.22 | -107.43 | UCIAMS131716 | 38260 | 790 | 42451 | Enk et al. 2015 |
| EID18 KX027561 | North America | YU | Old Crow; CRH- 94 | YP180.41 | 68.06 | -139.78 | | | | | |
| EID20 KX027560 | North America | YU | Old Crow; CRH- 94 | YP180.40 | 68.06 | -139.78 | | | | | |
| EID23SEP03 KX027535 | North America | IN | Near Goshen | HP1138 | 41.55 | -85.93 | BETA #92870 | 23050 | 180 | 27364 | Dan |
| EID25 KX027542 | North America | ME | Near Scarborough | HP1137 | 43.58 | -70.32 | OS-5636 | 12200 | 55 | 14091 | Hoyle et al 2004 |
| EID26 KX027537 | North America | WY | Near Rawlins | UW6368 | 41.5 | -107.63 | Average of 4 | 11560 | 60 | 13392 | Haynes et al 2013 |
| EID27 KX027536 | North America | NY | East Randolph Fish Hatchery | HP1134 | 42.15 | -78.93 | NOSAMS OS-93354 | 10350 | 45 | 12210 | Feranec & Kozlowski 2012 |
| EID30VEP84 KX027504 | North America | AB | Bindloss | NMC17845 | 50.95 | -110.13 | TO-8514 | 10930 | 100 | 12825 | Hills & Harington 2003 |

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|-------------------|------------------|----|---|-------------|-------|---------|--------------|--------|------|-------|---------------------------|
| L200s KX027490 | North America | SI | Taimyr Peninsula | 2005/915 | 73.75 | 102 | Beta-210777 | 27740 | 220 | 31501 | Debruyne et al 2008 |
| SED35 KX027493 | North America | CO | Badger Creek | DMNS08 | 40.29 | -106.45 | | | | | |
| SEP01 KX027489 | North America | SI | Taimyr Peninsula | 2002/472 | 74.42 | 107.75 | UCIAMS38677 | >48800 | | | Debruyne et al 2008 |
| SEP02 KX027527 | North America | MI | Clayton Township | HP1135 | 42.97 | -83.97 | UCIAMS131696 | 12450 | 40 | 14585 | Enk et al. 2015 |
| SEP06 KX027507 | North America | IL | Gravel Pit near Clear Lake | ISM04 | 39.82 | -89.53 | NZA 32590 | 20550 | 100 | 24745 | Enk et al. 2015 |
| SEP07 KX027559 | North America | IL | Wyanet | ISM07 | 41.37 | -89.65 | NZA 28851 | 15947 | 60 | 19237 | Saunders et al. 2010 |
| SEP11 KX027547 | North America | NE | Red Willow Fauna, Rw-102 | UNSM01 | 40.22 | -100.37 | UCIAMS131700 | 17070 | 70 | 20590 | Enk et al. 2015 |
| SEP17 KX027552 | North America | NE | Richardson Co, Big Nemaha R. | UNSM15 | 40.12 | -95.87 | | | | | |
| SEP19 KX027503 | North America | NE | South Fork Big Nemaha R. | UNSM21 | 40.07 | -95.82 | UCIAMS131707 | 13850 | 45 | 16770 | Enk et al. 2015 |
| SEP30 KX027511 | North America | NE | Crappie Hole | UNSM34 | 41.2 | -101.75 | UCIAMS131713 | 23670 | 190 | 27778 | Enk et al. 2015 |
| SEP31 KX027512 | North America | NE | Crappie Hole | UNSM35 | 41.2 | -101.75 | UCIAMS131714 | 23800 | 140 | 27863 | Enk et al. 2015 |
| SEP44 KX027494 | North America | OR | Beak (Bear?) Creek | UCMP17 | 42.22 | -122.72 | UCIAMS131699 | 18510 | 100 | 22387 | Enk et al. 2015 |
| SEP50 KX027538 | North America | MI | Morrison Lake Country Club, Saranac | HP1726 | 42.87 | -85.2 | BETA #282797 | 12320 | 50 | 14281 | Dan |
| SEP52 KX027505 | North America | SD | Near Brookings | ISM15 | 44.46 | -96.88 | CURL8895 | 12490 | 35 | 14716 | Mandel 2004 |
| SEP53 KX027500 | North America | KY | Big Bone Lick | UNSM30 | 38.88 | -84.75 | UCIAMS131710 | 13215 | 40 | 15884 | Enk et al. 2015 |
| SEP58 KX027513 | North America | CO | Dent | DMNS38 | 40.3 | -104.8 | Average of 3 | 10990 | 25 | 12827 | Waters & Stafford 2007 |
| SEP59 KX027514 | North America | CO | Dent | DMNS40 | 40.3 | -104.8 | Average of 3 | 10990 | 25 | 12827 | Waters & Stafford 2007 |
| SEP61 KX027564 | North America | YU | Ch'ijee's Bluff | YPC173.001 | 67.48 | -139.92 | UCIAMS41492 | >45400 | | | Debruyne et al 2008 |
| SEP62 KX027495 | North America | SI | Berelekh | Ber28 | 70.4 | 143.95 | UCIAMS38670 | 12125 | 30 | 14011 | Debruyne et al 2008 |
| SEP63 KX027532 | North America | YU | Dawson Area | NMC-49929 | 64.05 | -139.42 | AA17553 | 38600 | 2900 | 43496 | Debruyne et al 2008 |
| SEP64 KX027563 | North America | YU | Quartz Creek | YPC130.0002 | 63.82 | -139.03 | UCIAMS39891 | 36690 | 810 | 41230 | Debruyne et al 2008 |
| SEP65 KX027523 | North America | AK | Upper Ikpikpak R., North Slope | IK-99-5001 | 69.37 | -154.67 | CAMS 91968 | 33530 | 340 | 37856 | Debruyne et al 2008 |

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|----------------------|---------------|----|-------------------------------------|------------|-------|---------|--------------|-------|------------|-------|------------------------|
| SEP66 KX027531 | North America | YU | Dawson Area | NMC-42292 | 64.05 | -139.42 | AA17535 | 37920 | 2700 | 42815 | Debruyne et al 2008 |
| SEP68 KX027492 | North America | AK | Ester Creek | AM8744 | 64.83 | -148 | AA14896 | 16789 | 108 | 20256 | Debruyne et al 2008 |
| SEP69 KX027491 | North America | AK | Cleary Creek | AM104 | 65.17 | -147.5 | AA14906 | 42764 | 1737 | 46455 | Debruyne et al 2008 |
| SID04-11 KX027533 | North America | SI | Yakutia | 2006/001-2 | 63.5 | 142.75 | GrA-30727 | 41300 | (+900-650) | 44806 | Debruyne et al 2008 |
| SID36-10 KX027526 | North America | RU | Yuribei R., Yamal Peninsula | HP1095 | 68.9 | 69.5 | GrA-41246 | 41910 | (+550-450) | 45294 | Fisher et al 2012 |
| SSED27 KX027501 | North America | KY | Big Bone Lick | UNSM31 | 38.88 | -84.75 | UCIAMS131711 | 13950 | 45 | 16926 | Enk et al. 2015 |
| SSED28 KX027502 | North America | KY | Big Bone Lick | UNSM32 | 38.88 | -84.75 | UCIAMS131712 | 13860 | 40 | 16786 | Enk et al. 2015 |
| SSEP12 KX027548 | North America | NE | Red Willow Fauna, Rw-102 | UNSM02 | 40.22 | -100.37 | UCIAMS131701 | 12130 | 35 | 14014 | Enk et al. 2015 |
| SSEP18 KX027509 | North America | NE | Crappie Hole | UNSM16 | 41.2 | -101.75 | UCIAMS131706 | 23590 | 130 | 27713 | Enk et al. 2015 |
| SSEP25 KX027498 | North America | KY | Big Bone Lick | UNSM27 | 38.88 | -84.75 | UCIAMS131708 | 13985 | 45 | 16982 | Enk et al. 2015 |
| SSEP26 KX027499 | North America | KY | Big Bone Lick | UNSM29 | 38.88 | -84.75 | UCIAMS131709 | 12930 | 40 | 15445 | Enk et al. 2015 |
| SSEP38 KX027517 | North America | CO | Dent | DMNS47 | 40.3 | -104.8 | Average of 3 | 10990 | 25 | 12827 | Waters & Stafford 2007 |
| SSEP39 KX027519 | North America | CO | nd | DMNS23 | 39.07 | -105.13 | UCIAMS131692 | 12475 | 40 | 14661 | Enk et al. 2015 |
| SSEP45 KX027540 | North America | CA | San Antonio Creek | UCMP19 | 38.16 | -122.53 | | | | | |
| SSEP75 KX027508 | North America | YU | Old Crow | CMNH40031 | 68.06 | -139.78 | | | | | |
| SVED74 KX027539 | North America | CA | San Antonio Creek | UCMP04 | 38.16 | -122.53 | UCIAMS131697 | 19620 | 120 | 23642 | Enk et al. 2015 |
| SVEP05 KX027534 | North America | IL | Near Pekin | ISM01 | 40.52 | -89.72 | UCIAMS131694 | 17510 | 70 | 21151 | Enk et al. 2015 |
| SVEP08 KX027545 | North America | IL | Near Toledo | ISM09 | 39.28 | -88.23 | | | | | |
| SVEP09 KX027530 | North America | IL | North LaSalle County | ISM12 | 41.55 | -88.87 | UCIAMS131695 | 12495 | 45 | 14724 | Enk et al. 2015 |
| SVEP13 KX027549 | North America | NE | Red Willow Fauna, Rw-102 | UNSM07 | 40.22 | -100.37 | | | | | |
| SVEP1478 KX027550 | North America | NE | Red Willow Fauna, Rw-102 | UNSM08 | 40.22 | -100.37 | UCIAMS131702 | 16160 | 80 | 19502 | Enk et al. 2015 |
| SVEP15 KX027551 | North America | NE | Little Sand Pit near McCook, Rw-110 | UNSM09 | 40.2 | -100.5 | UCIAMS131703 | 11585 | 35 | 13420 | Enk et al. 2015 |

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|----------------------|---------------|----|---------------------|---------|-------|---------|-----------------|-------|-----|-------|--------------------------|
| SVEP1679 KX027546 | North America | NE | Trenton Reservoir | UNSM14 | 40.17 | -101.07 | UCIAMS131705 | 33670 | 450 | 37997 | Enk et al. 2015 |
| SVEP20 KX027553 | North America | NE | Palisade Sand Pit | UNSM22 | 40.35 | -101.42 | | | | | |
| SVEP29 KX027510 | North America | NE | Crappie Hole | UNSM33 | 41.2 | -101.75 | | | | | |
| SVEP32 KX027497 | North America | NE | Biehl Farm | UNSM42 | 40.8 | -99.65 | UCIAMS131715 | 15200 | 60 | 18470 | Enk et al. 2015 |
| SVEP36 KX027543 | North America | CO | Snowmass Site | SM3 | 39.21 | -106.93 | | | | | |
| SVEP37 KX027557 | North America | WA | Wenas Creek | WAST_01 | 46.7 | -120.55 | WK-18064 | 13398 | 58 | 16122 | Lubinski et al 2014 |
| SVEP41 KX027515 | North America | CO | Dent | DMNS43b | 40.3 | -104.8 | Average of 3 | 10990 | 25 | 12827 | Waters & Stafford 2007 |
| SVEP43 KX027516 | North America | CO | Dent | DMNS44 | 40.3 | -104.8 | Average of 3 | 10990 | 25 | 12827 | Waters & Stafford 2007 |
| SVEP48 KX027544 | North America | OH | Near Cleves | ISM10 | 39.15 | -84.75 | | | | | |
| SVEP49 KX027520 | North America | MI | North of Assyria | UM22798 | 42.52 | -85.12 | UCIAMS131693 | 11100 | 35 | 12985 | Enk et al. 2015 |
| SVEP5681 KX027525 | North America | NE | La Sena | DMNS28b | 40.38 | -100.23 | AA-6972 | 18440 | 145 | 22298 | Holen 2006 |
| SVEP57 KX027518 | North America | CO | Dent | DMNS49 | 40.3 | -104.8 | Average of 3 | 10990 | 25 | 12827 | Waters & Stafford 2007 |
| SVEP72 KX027496 | North America | NE | Beverly Gravel Pits | UNSM13 | 40.3 | -101.03 | UCIAMS131704 | 10650 | 30 | 12633 | Enk et al. 2015 |
| SVEP7380 KX027558 | North America | WA | Whidbey Island | UCMP09 | 48.12 | -122.58 | UCIAMS131698 | 19200 | 120 | 23139 | Enk et al. 2015 |
| VEP82 KX027506 | North America | NY | Near Chittenango | HP1133 | 43.05 | -75.87 | NOSAMS OS-93430 | 11250 | 65 | 13116 | Feranec & Kozlowski 2012 |
| VEP83 KX027562 | North America | YU | Old Crow; CRH-11A | YP221.2 | 67.84 | -139.85 | | | | | |

Table S4: Other previously published mitochondrial genomes used in this analysis

| ID | Region | Location | Museum Number | Latitude | Longitude | Radiocarbon Number | 14C date | Sigma | intCal13 Median | GenBank Accession | Reference |
|----------|--------|--|---------------|----------|-----------|---------------------------------|----------|----------|-----------------|-------------------|---------------------|
| M13 | Russia | Adams mammoth; Lena Delta, N-E Siberia | | 72.50 | 127.50 | | 35800 | 1200 | 40418 | EU153445 | Gilbert et al. 2007 |
| M15 | Russia | Ayon Island, Russia | | 69.80 | 169.00 | OxA 19605 | 13995 | 55 | 16996 | EU153446 | Gilbert et al. 2008 |
| M18 | Russia | Gydan Peninsula, Taimyr, West Siberia | KOS-W-1 | 72.09 | 79.35 | OxA 17116 | 17125 | 70 | 20655 | EU153447 | Gilbert et al. 2007 |
| M19 | Russia | Yukagir Village, Yakutsk, Russia | | 71.87 | 140.58 | GrN 28258, GrN 28259, GrN 24288 | 18560 | 50 | 22434 | EU153448 | Gilbert et al. 2008 |
| M1 | Russia | unknown; possibly Northern Yakutia (about 66 to 76N, 106-160E) | | | | | | | | EU153444 | Gilbert et al. 2007 |
| M20 | Russia | Bolshoy Lyakhovsk(i)y Isl. | LDR-P72 | 73.64 | 142.89 | OxA 19608 | 63500 | infinite | | EU153450 | Gilbert et al. 2008 |
| M21 | Russia | Bolshoy Lyakhovsk(i)y Isl. | LDR-P73 | 73.21 | 143.60 | OxA 19609 | 58000 | infinite | | EU153451 | Gilbert et al. 2008 |
| M22 | Russia | Novosibirsk Islands N-E Siberia | LDR-P74 | 73.64 | 142.67 | OxA 17111 | 50200 | 900 | | EU153452 | Gilbert et al. 2007 |
| M25 | Russia | Bolshaya Chukochya River, Russia | F-0299 | 69.79 | 157.70 | OxA 19610 | 59300 | 2700 | | EU153453 | Gilbert et al. 2008 |
| M26 | Russia | Indigirka River, N-E Siberia | F-0308 | 68.60 | 147.06 | OxA 17114 | 24740 | 110 | 28769 | EU153454 | Gilbert et al. 2007 |
| M2 | Russia | Jarkov mammoth, Taimyr Peninsula | | 73.32 | 105.40 | | 20380 | 140 | 24507 | EU153449 | Gilbert et al. 2007 |
| M3 | Russia | Fishhook mammoth, Taimyr Peninsula | | 74.15 | 99.59 | | 20620 | 70 | 24833 | EU153455 | Gilbert et al. 2007 |
| M4 | Russia | unknown; possibly Northern Yakutia (about 66 to 76N, 106-160E) | | | | OxA 17098 | 18545 | 70 | 22422 | EU153456 | Gilbert et al. 2007 |
| M5 | Russia | unknown; possibly Northern Yakutia (about 66 to 76N, 106-160E) | | | | | | | | EU153457 | Gilbert et al. 2007 |
| M8 | Russia | Dima mammoth, Magadan Region | | 62.67 | 147.93 | OxA 17102 | 46900 | 700 | 46962 | EU153458 | Gilbert et al. 2007 |
| NC007596 | Russia | Berelyokh | | 71.00 | 145.00 | KIA 25289 | 12170 | 50 | 14056 | NC007596 | Krause et al. 2006 |
| Rogaev | Russia | Enmynveem | | 68.17 | 165.93 | | 32750 | 1000 | 37068 | DQ316067 | Rogaev et al. 2006 |

Table S5: Details of individuals used in the *relaxed* and *strict* analyses.

| ID | Unique reads mapped | Average Coverage | Cov3 Supp66_0.33 (relaxed) | Cov10 Supp90_0.2 (strict) | Clade |
|----------|---------------------|------------------|----------------------------|---------------------------|-------|
| 10643 | 36657 | 139.06 | Y | Y | DE |
| 10717 | 66970 | 289.31 | Y | Y | 2/A |
| 10719 | 71765 | 315.98 | Y | Y | DE |
| AlexKrim | 19412 | 68.21 | Y | Y | B2 |
| SP1021 | 10132 | 36.32 | Y | Y | DE |
| SP1022 | 78176 | 345.33 | Y | Y | DE |
| SP1144 | 211184 | 818.96 | Y | Y | B2 |
| SP1145 | 100143 | 376.79 | Y | Y | B2 |
| SP1349 | 8526 | 31.76 | Y | Y | 2/A |
| SP1414 | 5396 | 16.14 | Y | N | B2 |
| SP1419 | 106672 | 412.9 | Y | Y | DE |
| SP1420 | 1218 | 4.02 | Y | N | 2/A |
| SP1421 | 88251 | 409.63 | Y | Y | DE |
| SP1422 | 23703 | 79.51 | Y | Y | DE |
| SP1584 | 1024 | 3.31 | N | N | - |
| SP167 | 5406 | 15.94 | Y | N | B2 |
| SP1781 | 540 | 1.95 | N | N | - |
| SP1785 | 13392 | 39.66 | Y | Y | B2 |
| SP2013 | 11218 | 34.79 | Y | Y | B2 |
| SP2014 | 28926 | 95.29 | Y | Y | B2 |
| SP2015 | 8265 | 23.71 | Y | N | B2 |
| SP2016 | 10195 | 30.51 | Y | Y | B2 |
| SP2017 | 24778 | 88 | Y | Y | B2 |
| SP2218 | 37566 | 140.21 | Y | Y | DE |
| SP2220 | 135075 | 633.16 | Y | Y | DE |
| SP2222 | 22461 | 67.92 | Y | Y | DE |
| SP2223 | 4943 | 16.59 | Y | N | DE |
| SP2225 | 9664 | 40.31 | Y | Y | DE |
| SP2283 | 7441 | 21.91 | Y | N | B2 |
| SP2284 | 10705 | 31.42 | Y | N | B2 |
| SP2293 | 5794 | 17.41 | Y | N | B2 |
| SP2299 | 1481 | 4.32 | N | N | - |
| SP2300 | 751 | 2.17 | N | N | - |
| SP2303 | 5496 | 16.3 | Y | N | B2 |
| SP2304 | 4377 | 12.79 | Y | N | B2 |
| SP2305 | 2370 | 6.83 | Y | N | B2 |
| SP2307 | 6553 | 19.29 | Y | N | B2 |
| SP2308 | 12577 | 37.29 | Y | N | B2 |

| | | | | | |
|------------|--------|--------|---|---|----|
| SP2386 | 6553 | 31.05 | Y | Y | DE |
| SP2387 | 21449 | 99.05 | Y | Y | DE |
| SP2389 | 2021 | 9.66 | Y | N | DE |
| SP2401 | 1575 | 7.11 | Y | N | DE |
| SP2402 | 552 | 2.57 | N | N | - |
| SP2411 | 41242 | 212.03 | Y | Y | DE |
| SP2412 | 40623 | 201.38 | Y | Y | B2 |
| SP2415 | 116567 | 503.09 | Y | Y | DE |
| SP2416 | 77000 | 416.61 | Y | Y | B2 |
| SP2453 | 2786 | 10.79 | Y | N | B2 |
| SP317 | 564 | 2.19 | N | N | - |
| SP738 | 667 | 2.52 | N | N | - |
| SP739 | 799 | 2.82 | N | N | - |
| SP741 | 7697 | 23.34 | Y | N | DE |
| SP743 | 731 | 2.1 | N | N | - |
| SP744 | 6431 | 17.87 | Y | N | DE |
| EEP41 | 2927 | 10.06 | Y | N | C |
| EEP42 | 416 | 1.54 | N | N | - |
| EEP43 | 601 | 1.63 | N | N | - |
| EID02 | 73812 | 224.96 | Y | Y | C |
| EID03 | 4987 | 16.54 | Y | N | C |
| EID05 | 10262 | 32.61 | Y | Y | C |
| EID07 | 1682 | 7.51 | Y | N | C |
| EID09 | 806 | 3.09 | N | N | - |
| EID10 | 3598 | 18.16 | Y | Y | C |
| EID11 | 3810 | 12.9 | Y | N | C |
| EID13 | 1601 | 6.91 | Y | N | C |
| EID15 | 83069 | 220.15 | Y | Y | C |
| EID18 | 1834 | 5.24 | Y | N | B1 |
| EID20 | 1392 | 4.58 | Y | N | B1 |
| EID23SEP03 | 20790 | 63.09 | Y | Y | C |
| EID25 | 13543 | 46.57 | Y | Y | C |
| EID26 | 8489 | 25.29 | Y | Y | C |
| EID27 | 30981 | 90.94 | Y | Y | C |
| EID30VEP84 | 5204 | 13.43 | Y | N | C |
| L200s | 11850 | 49.01 | Y | Y | DE |
| SED35 | 367 | 1.18 | N | N | - |
| 1-Sep | 148315 | 803.33 | Y | Y | DE |
| 2-Sep | 10715 | 37.02 | Y | Y | C |
| 6-Sep | 3163 | 10.85 | Y | N | C |
| 7-Sep | 10127 | 32.08 | Y | Y | C |
| 11-Sep | 14337 | 43.04 | Y | Y | C |
| 17-Sep | 3218 | 8.5 | Y | N | C |

| | | | | | |
|----------|-------|--------|---|---|----|
| 19-Sep | 9461 | 25.67 | Y | Y | C |
| 30-Sep | 3748 | 13.25 | Y | N | C |
| Sep-31 | 6402 | 19.68 | Y | Y | C |
| Sep-44 | 6961 | 24.3 | Y | Y | C |
| Sep-50 | 11459 | 29.54 | Y | Y | C |
| Sep-52 | 38058 | 149.89 | Y | Y | C |
| Sep-53 | 38446 | 110.08 | Y | Y | C |
| Sep-58 | 4403 | 15.65 | Y | Y | C |
| Sep-59 | 7663 | 25.13 | Y | Y | C |
| Sep-61 | 84565 | 300.07 | Y | Y | C |
| Sep-62 | 48163 | 192.6 | Y | Y | DE |
| Sep-63 | 66174 | 255.81 | Y | Y | C |
| Sep-64 | 8869 | 34.23 | Y | Y | DE |
| Sep-65 | 13220 | 52.92 | Y | Y | DE |
| Sep-66 | 68805 | 241.73 | Y | Y | B1 |
| Sep-68 | 47614 | 179.31 | Y | Y | DE |
| Sep-69 | 58248 | 239.46 | Y | Y | C |
| SID04-11 | 10868 | 44.62 | Y | Y | A |
| SID36-10 | 46331 | 163.01 | Y | Y | B2 |
| SSED27 | 4329 | 10.05 | Y | N | C |
| SSED28 | 5391 | 12.95 | Y | N | C |
| SSEP12 | 14133 | 41.18 | Y | Y | C |
| SSEP18 | 11513 | 40.72 | Y | Y | C |
| SSEP25 | 5042 | 12.17 | Y | N | C |
| SSEP26 | 2922 | 7.12 | Y | N | C |
| SSEP38 | 20118 | 54.94 | Y | Y | C |
| SSEP39 | 32664 | 98.51 | Y | Y | C |
| SSEP45 | 13303 | 32.12 | Y | Y | C |
| SSEP75 | 6236 | 23.12 | Y | N | B1 |
| SVED74 | 5022 | 13.29 | Y | N | C |
| SVEP05 | 7469 | 18.62 | Y | N | C |
| SVEP08 | 3040 | 7.29 | Y | N | C |
| SVEP09 | 12779 | 35.53 | Y | Y | C |
| SVEP13 | 1168 | 2.95 | N | N | - |
| SVEP1478 | 5091 | 13.4 | Y | N | C |
| SVEP15 | 7065 | 20.06 | Y | N | C |
| SVEP1679 | 3261 | 8.3 | Y | N | C |
| SVEP20 | 9061 | 24.36 | Y | Y | C |
| SVEP29 | 2455 | 7.65 | Y | N | C |
| SVEP32 | 4749 | 13.58 | Y | N | C |
| SVEP36 | 2027 | 4.49 | N | N | - |
| SVEP37 | 5100 | 13.45 | Y | N | C |
| SVEP41 | 15995 | 50.88 | Y | Y | C |

| | | | | | |
|----------|--------|--------|---|---|---|
| SVEP43 | 20268 | 62.94 | Y | Y | C |
| SVEP48 | 7276 | 18.4 | Y | N | C |
| SVEP49 | 9328 | 23.68 | Y | Y | C |
| SVEP5681 | 3927 | 12.81 | Y | N | C |
| SVEP57 | 12996 | 37.92 | Y | Y | C |
| SVEP72 | 3511 | 8.45 | Y | N | C |
| SVEP7380 | 1668 | 4.16 | Y | N | C |
| VEP82 | 129063 | 405.48 | Y | Y | C |
| VEP83 | 1015 | 3.09 | N | N | - |



Figure S1. Maximum Clade Credibility (MCC) tree of the *relaxed* data set with the tip-dating method. Posterior probabilities are provided at each internal branch. The scaled axis of time is offset by 4,641, the calibrated age of the youngest sample. Samples labeled in red are from Asia, those in green are from North America and those in blue are sampled from Europe.

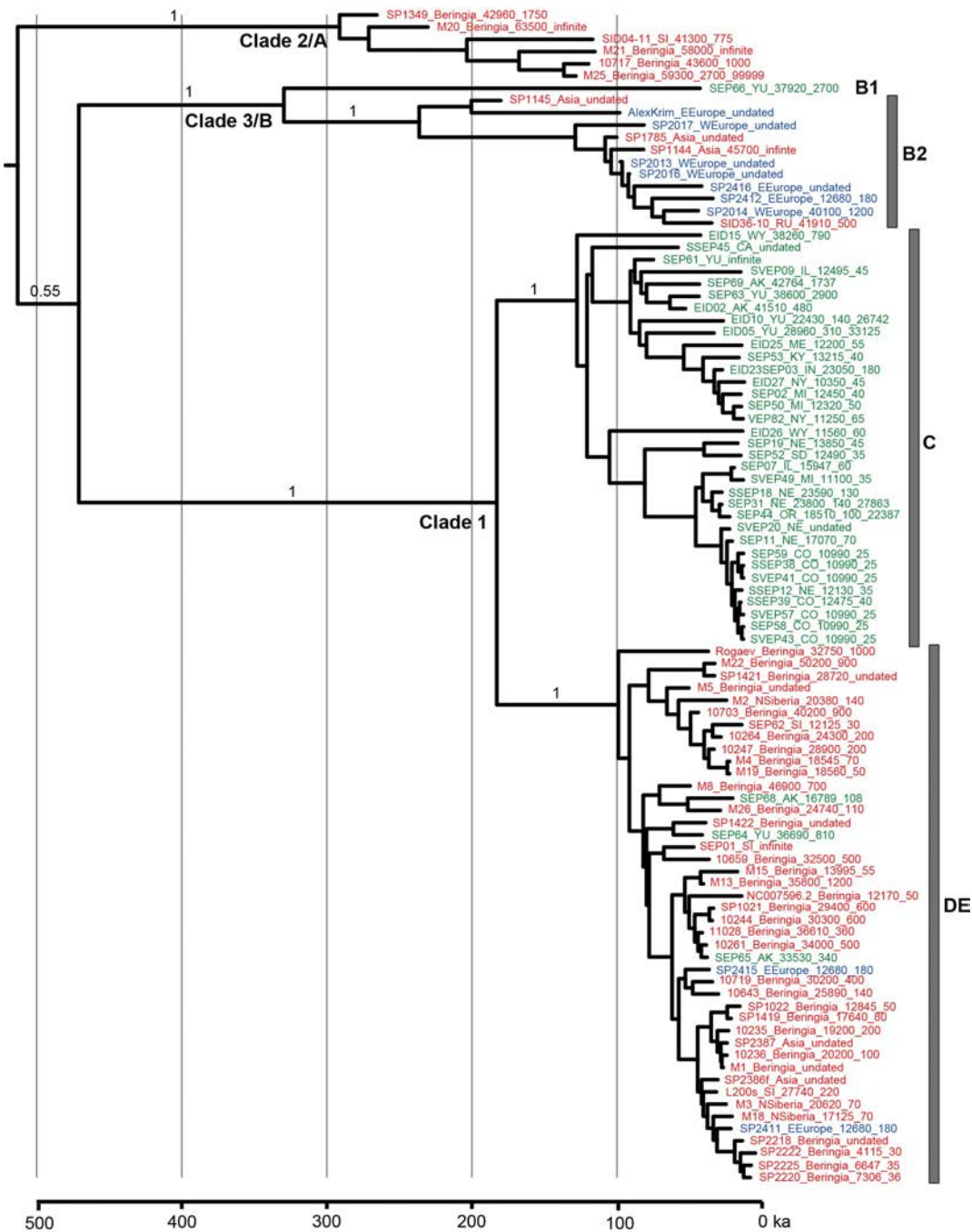


Figure S2. MCC tree of the *strict* data set with the tip-dating method. Descriptions are the same as in Fig. 1.

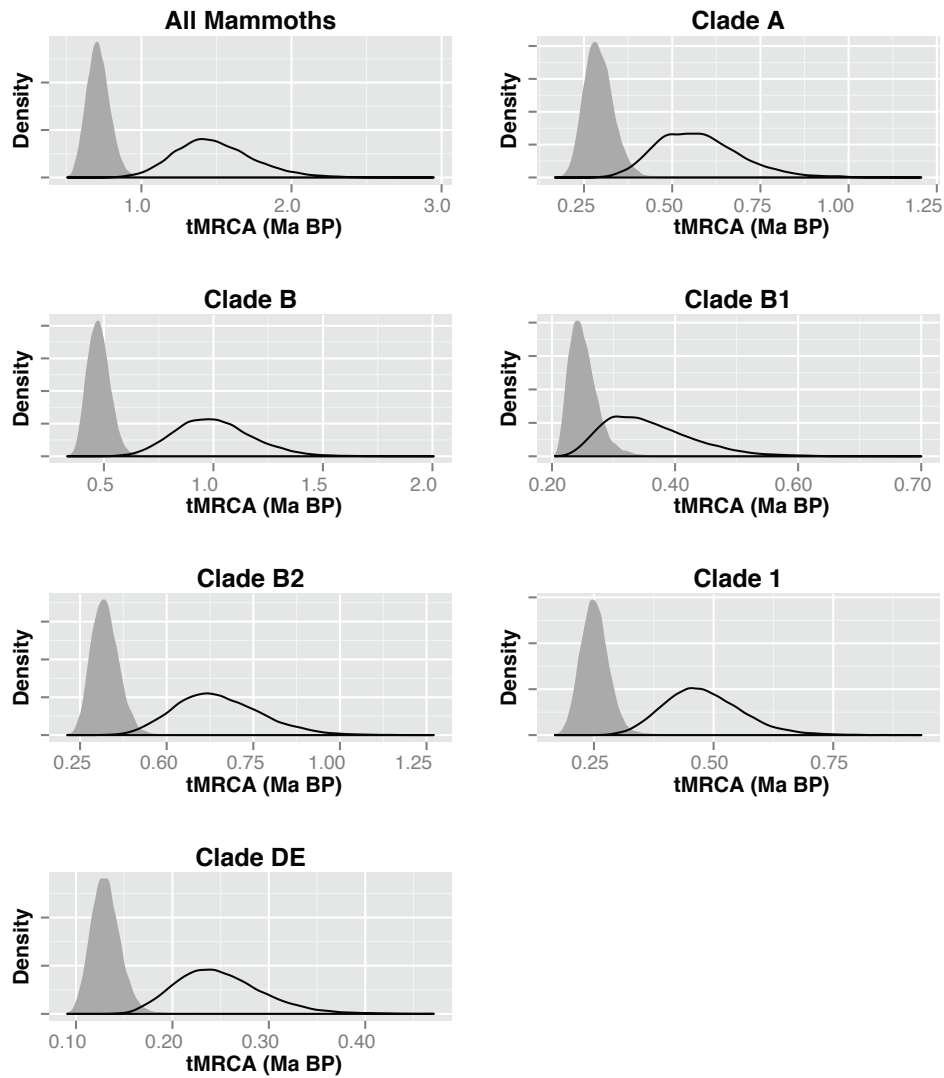


Figure S3. Gaussian densities (95% highest posterior densities) of estimated tMRCA for each major clade using the two dating methods. Results of the tip-dating method are given as shaded gray distributions, and results from the root-and-tip-dating method are shown as a black line.