Supplemental Information

Reconstructing the Deep Population History

of Central and South America

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Table S1. Relatedness of ancient to present-day people. f_4-statistics on the Illumina dataset of the form f_4(Mbuti, Test; South American 1, South American 2) where "Test" is a newly reported ancient group, "South American 1" is the population with highest affinity to *Test* in outgroup f_3-statistics (excluding *Chorotega* due to limited data), and "South American 2" is the population from the Central Andes (*Quechua*), Southern Cone (*Chilote/Huilliche*) or Amazonia (*Karitiana*) that produces the most negative Z score. Because both "Highest outgroup f_3" and "South America" are selected to maximize Z-scores, there is a multiple hypothesis issue that we do not account for here, and the true significance is less than would be expected from the absolute Z-score. Specifically, we are examining 50 comparison populations for each *Test* population to identify the one that maximizes the outgroup-f_3 statistic, and 3 representative South American populations, for a total of 150 tests (Related to Figure S1). We also report f_4-statistics on the Illumina dataset of the form f_4(Mbuti, Brazil_Jabuticabeira2_2000BP; Modern Brazil 1, Modern Brazil 2), and on the *Brazil_Jabuticabeira2_subset* data, which are the same as *Brazil_Jabuticabeira2_2000BP* data except with the 1200BP individual removed (I9056_d) (Related to Figure 2 and Figures S1 and S2).

Outgroup	Test	South American 1 (Region or Language Family)	South American 2 (Region or Language Family)	f_4-statistic	Z-score	Number of SNPs
Mbuti	Chile_Conchali_700BP	Huilliche (Southern Cone)	Quechua (Central Andes)	-0.005311	-15.441	280709
Mbuti	Peru_Laramate_900BP	Quechua (Central Andes)	Karitiana (Amazonia)	-0.004056	-14.577	307061
Mbuti	Chile_PicaOcho_700BP	Aymara (Central Andes)	Karitiana (Amazonia)	-0.003705	-9.321	157160
Mbuti	Peru_Cuncaicha_4200BP	Aymara (Central Andes)	Karitiana (Amazonia)	-0.003619	-9.128	272057
Mbuti	Chile_LosRieles_5100BP	Huilliche (Southern Cone)	Quechua (Central Andes)	-0.00364	-8.672	241676
Mbuti	Peru_Lauricocha_8600BP	Quechua (Central Andes)	Karitiana (Amazonia)	-0.002728	-8.24	305918
Mbuti	Peru_Cuncaicha_3300BP	Aymara (Central Andes)	Karitiana (Amazonia)	-0.003143	-7.907	236585
Mbuti	Peru_LaGalgada_4100BP	Quechua (Central Andes)	Karitiana (Amazonia)	-0.002808	-7.651	285857
Mbuti	Peru_Lauricocha_3500BP	Quechua (Central Andes)	Karitiana (Amazonia)	-0.002953	-7.471	189510
Mbuti	Argentina_ArroyoSeco2_7700BP	Chono (Southern Cone)	Quechua (Central Andes)	-0.002334	-5.767	278258
Mbuti	Peru_Cuncaicha_9000BP	Aymara (Central Andes)	Karitiana (Amazonia)	-0.002357	-5.575	276660
Mbuti	Peru_Lauricocha_5800BP	Quechua (Central Andes)	Chilote (Southern Cone)	-0.00254	-5.5	192658
Mbuti	Argentina_LagunaChica_6800BP	Chono (Southern Cone)	Quechua (Central Andes)	-0.001851	-3.663	130251
Mbuti	Chile_LosRieles_10900BP	Chono (Southern Cone)	Huilliche (Southern Cone)	-0.001817	-3.128	228506
Mbuti	Brazil_Moraes_5800BP	Arara (Amazonia)	Huilliche (Southern Cone)	-0.002545	-2.977	82759
Mbuti	Brazil_Laranjal_6700BP	Arara (Amazonia)	Chilote (Southern Cone)	-0.001435	-2.171	159697
Mbuti	Belize_MayahakCabPek_9300BP	Jamamadi (Amazonia)	Karitiana (Amazonia)	-0.001341	-1.787	137431
Mbuti	Brazil_LapaDoSanto_9600BP	Arara (Amazonia)	Karitiana (Amazonia)	-0.00086	-1.919	298748
Mbuti	Belize_SakiTzul_7400BP	Arara (Amazonia)	Huilliche (Southern Cone)	-0.001036	-1.543	164954

Mbuti	Brazil_Jabuticabeira2_2000BP	Guarani (Tupi-Guarani)	Kaingang (Ge)	0.002102	2.687	45181
Mbuti	Brazil_Jabuticabeira2_2000BP	Parakana (Tupi-Guarani)	Kaingang (Ge)	0.003853	3.842	44322
Mbuti	Brazil_Jabuticabeira2_2000BP	Arara (Carib)	Kaingang (Ge)	0.000202	0.185	42046
Mbuti	Brazil_Jabuticabeira2_2000BP	Guarani (Tupi-Guarani)	Arara (Carib)	0.001536	1.815	49171
Mbuti	Brazil_Jabuticabeira2_2000BP	Parakana (Tupi-Guarani)	Arara (Carib)	0.00342	3.155	48341
Mbuti	Brazil_Jabuticabeira2_subset	Guarani (Tupi-Guarani)	Kaingang (Ge)	0.001771	2.155	40713
Mbuti	Brazil_Jabuticabeira2_subset	Parakana (Tupi-Guarani)	Kaingang (Ge)	0.003323	3.124	39931
Mbuti	Brazil_Jabuticabeira2_subset	Arara (Carib)	Kaingang (Ge)	-0.000132	-0.114	37881
Mbuti	Brazil_Jabuticabeira2_subset	Guarani (Tupi-Guarani)	Arara (Carib)	0.001523	1.718	44249
Mbuti	Brazil_Jabuticabeira2_subset	Parakana (Tupi-Guarani)	Arara (Carib)	0.003194	2.759	43489