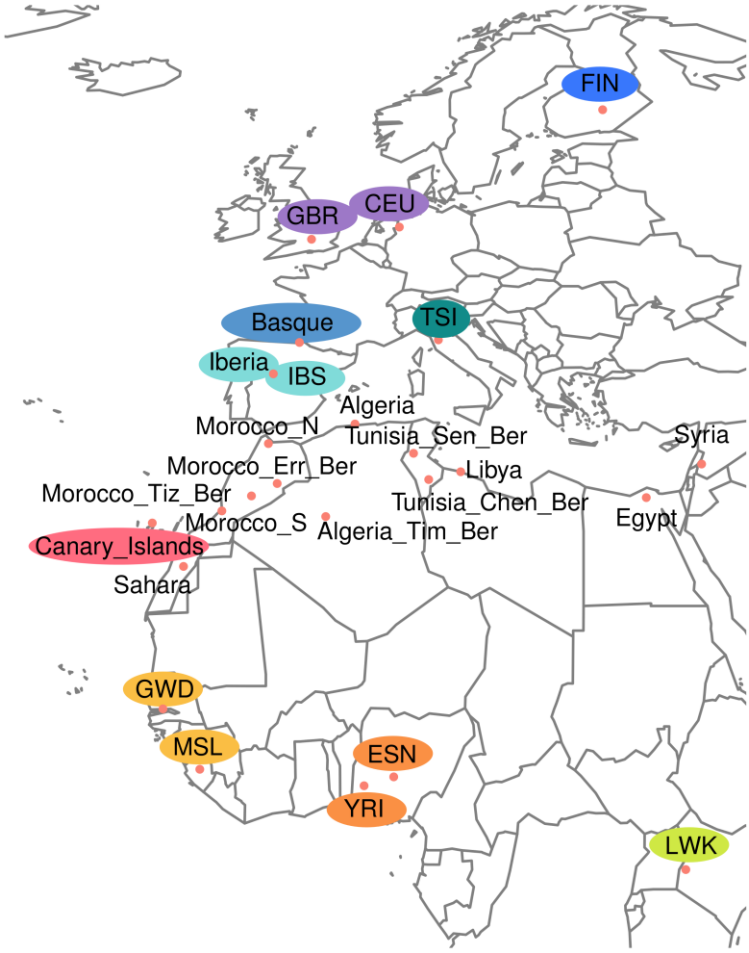
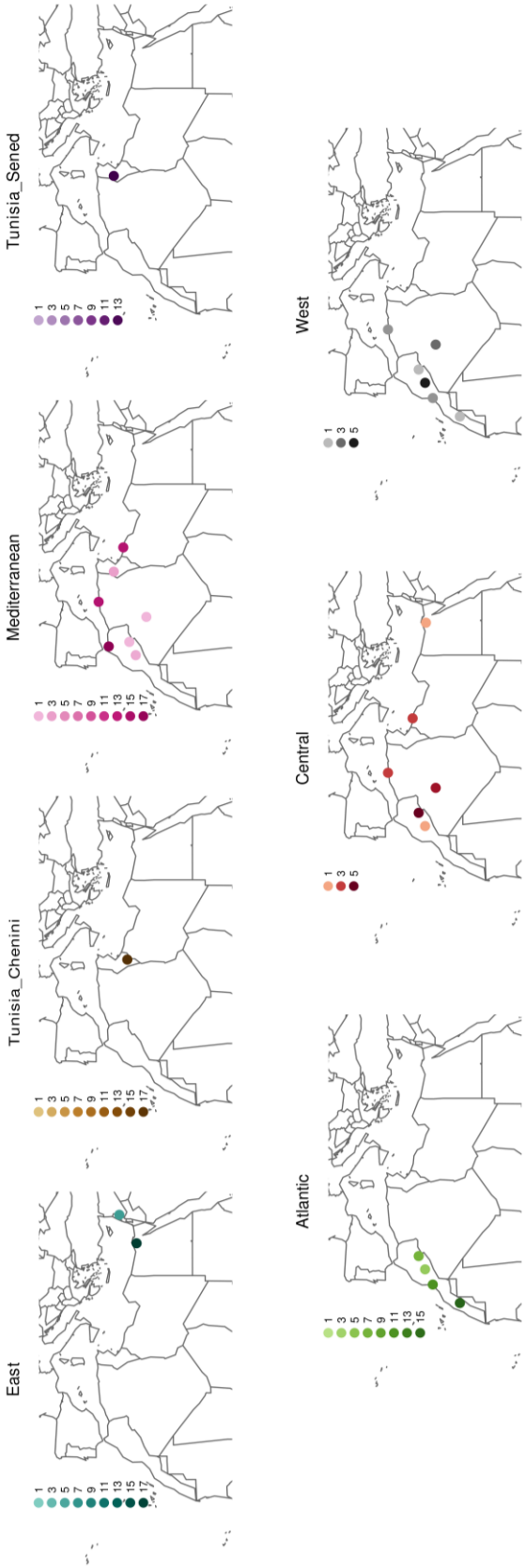
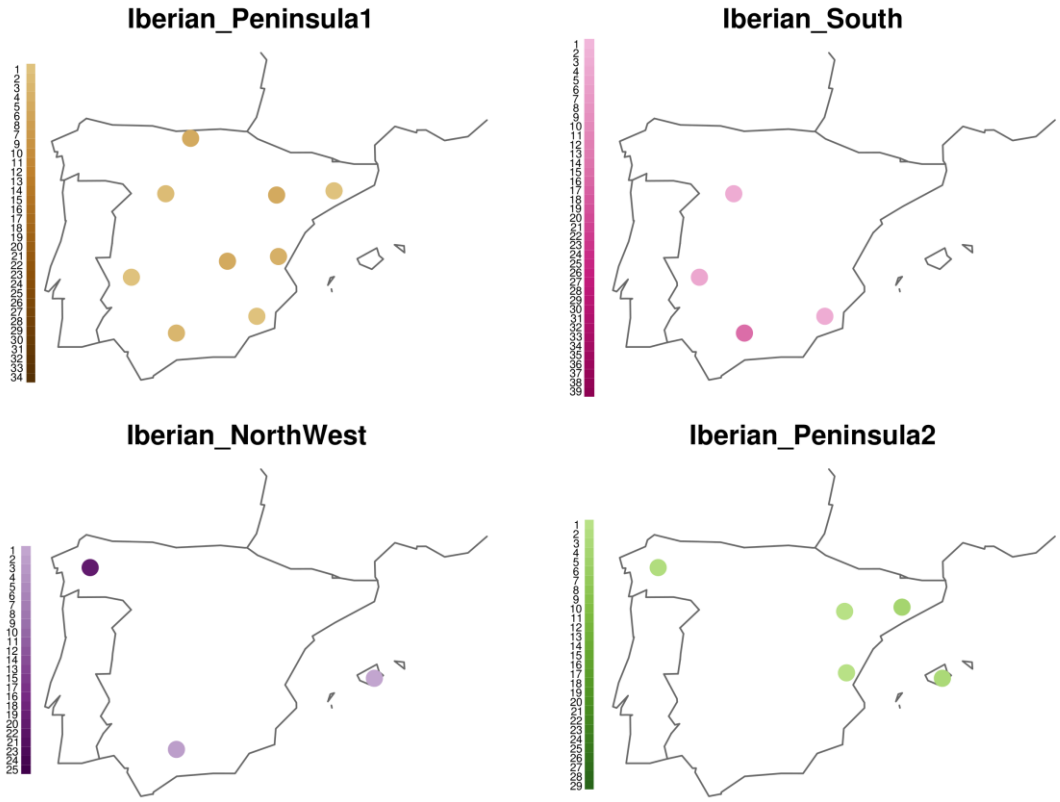
Supplementary material



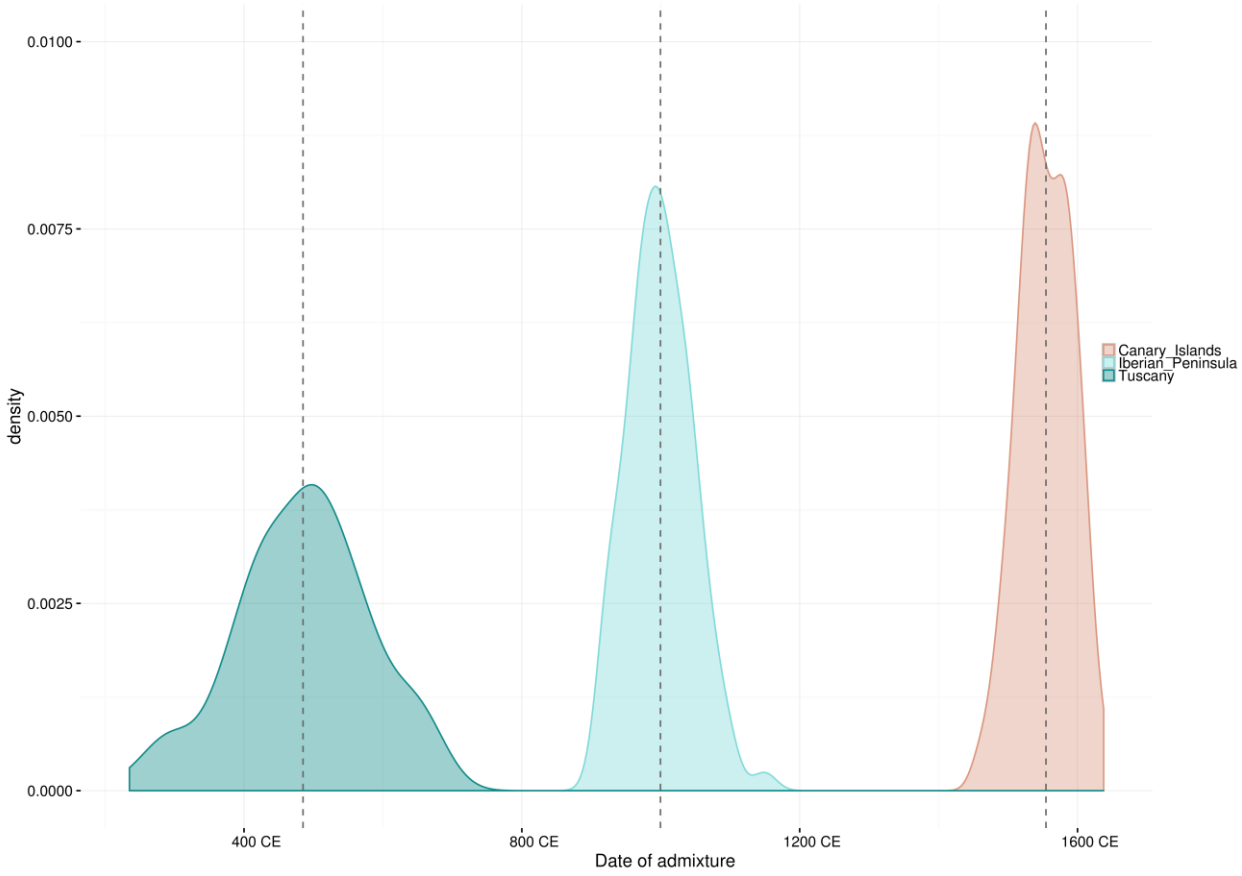
S1 Figure. Geographical distribution of the populations analyzed. The geographical populations that cluster together in the FineSTRUCTURE classification are highlighted in the same color. Note that North African samples do not cluster in a single group according to the FineSTRUCTURE analysis.



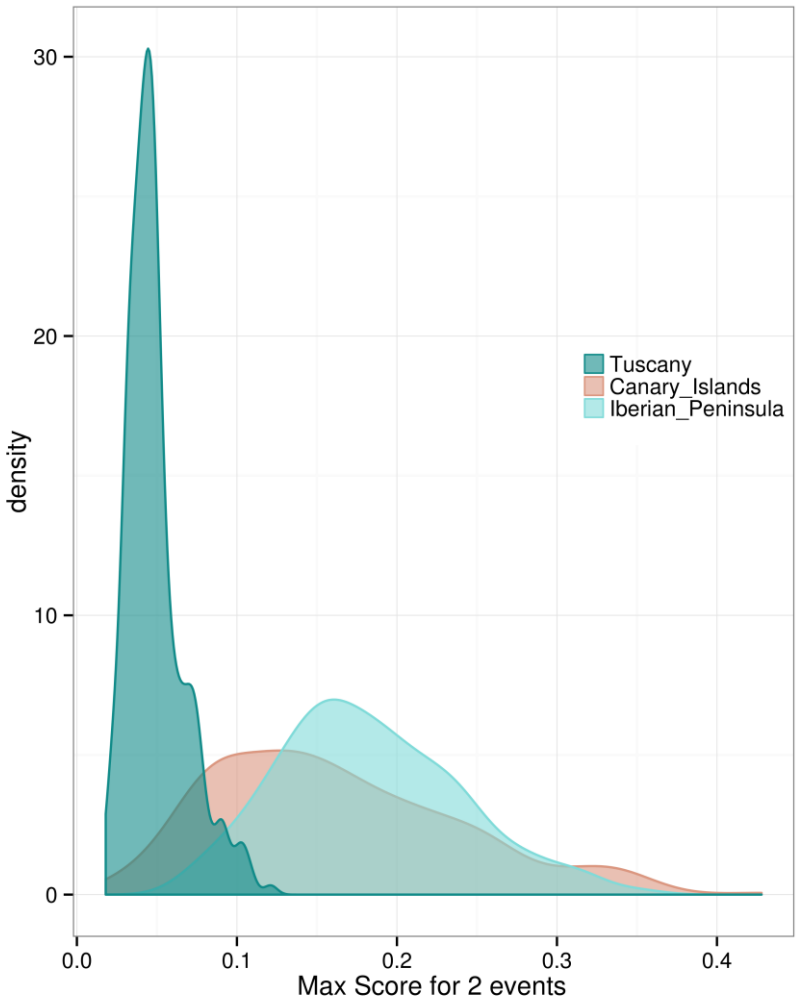
S2 Figure. Geographical distribution of the clusters established with FineSTRUCTURE for North African populations. The color gradient represents the number of individuals from each geographical population that is included in the FineSTRUCTURE cluster.



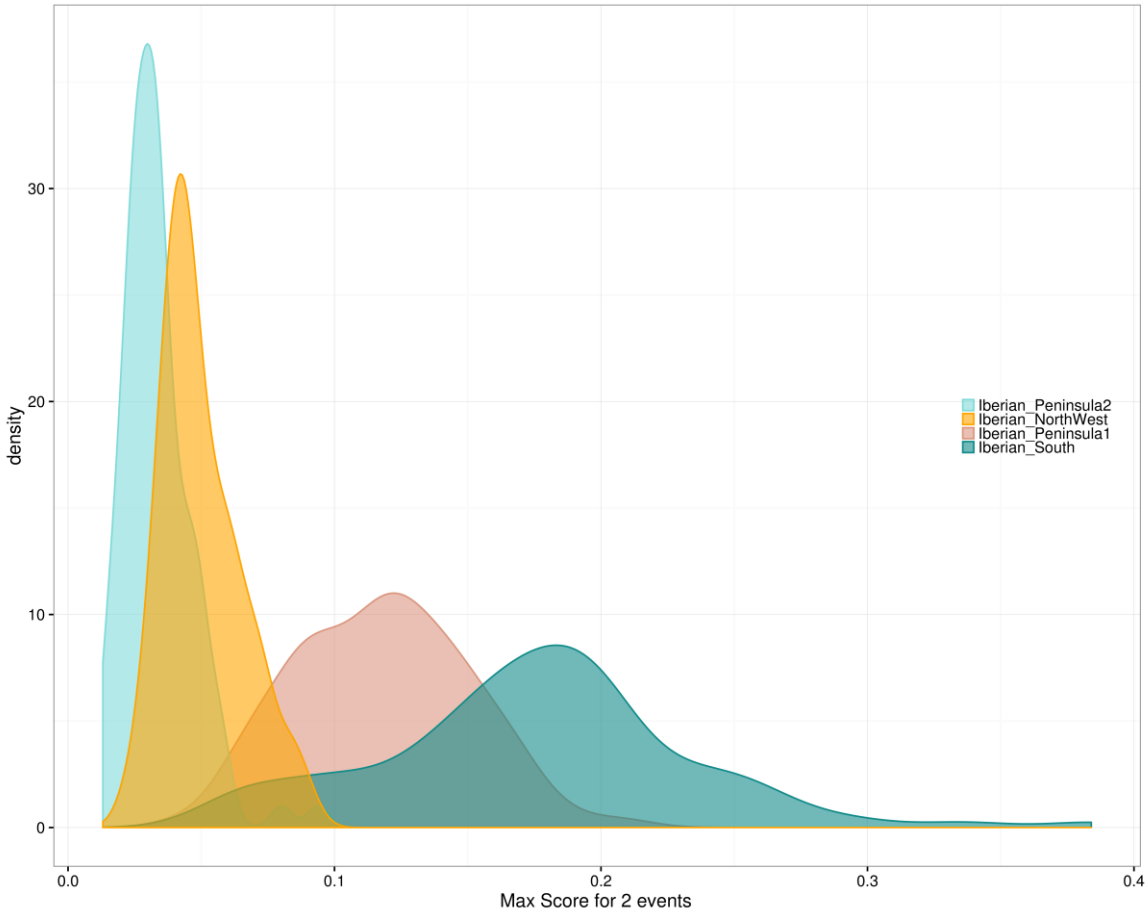
S3 Figure. Geographical distribution of the clusters established with FineStructure for Iberian populations. The color gradient represents the number of individuals from each geographical population that is included in the FineStructure cluster. For some 1000 genomes project individuals no geographic coordinates were available, in particular 7 samples from Iberian_Peninsula1, 14 from Iberian_South, 2 from Iberian_NorthWest and 18 from Iberian_Peninsula2.



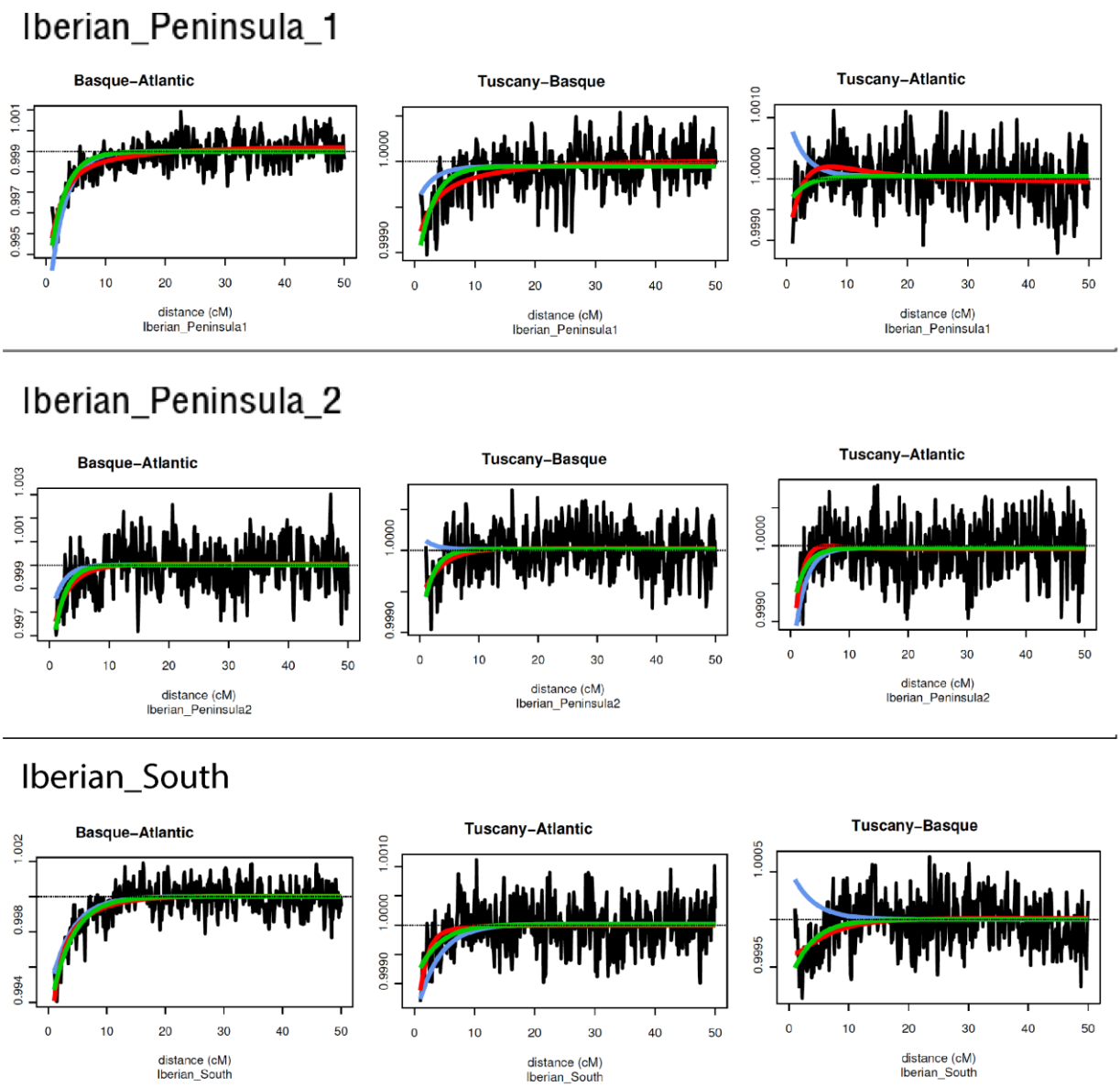
S4 Figure. Density plot for the admixture dates estimates after 100 bootstrap iterations of Globetrotter for Tuscany, Iberia, and the Canary islands. The x-axis shows the date of admixture in years. (Dark blue for Tuscany, light blue Iberian_Peninsula and pink Canary_Islands).



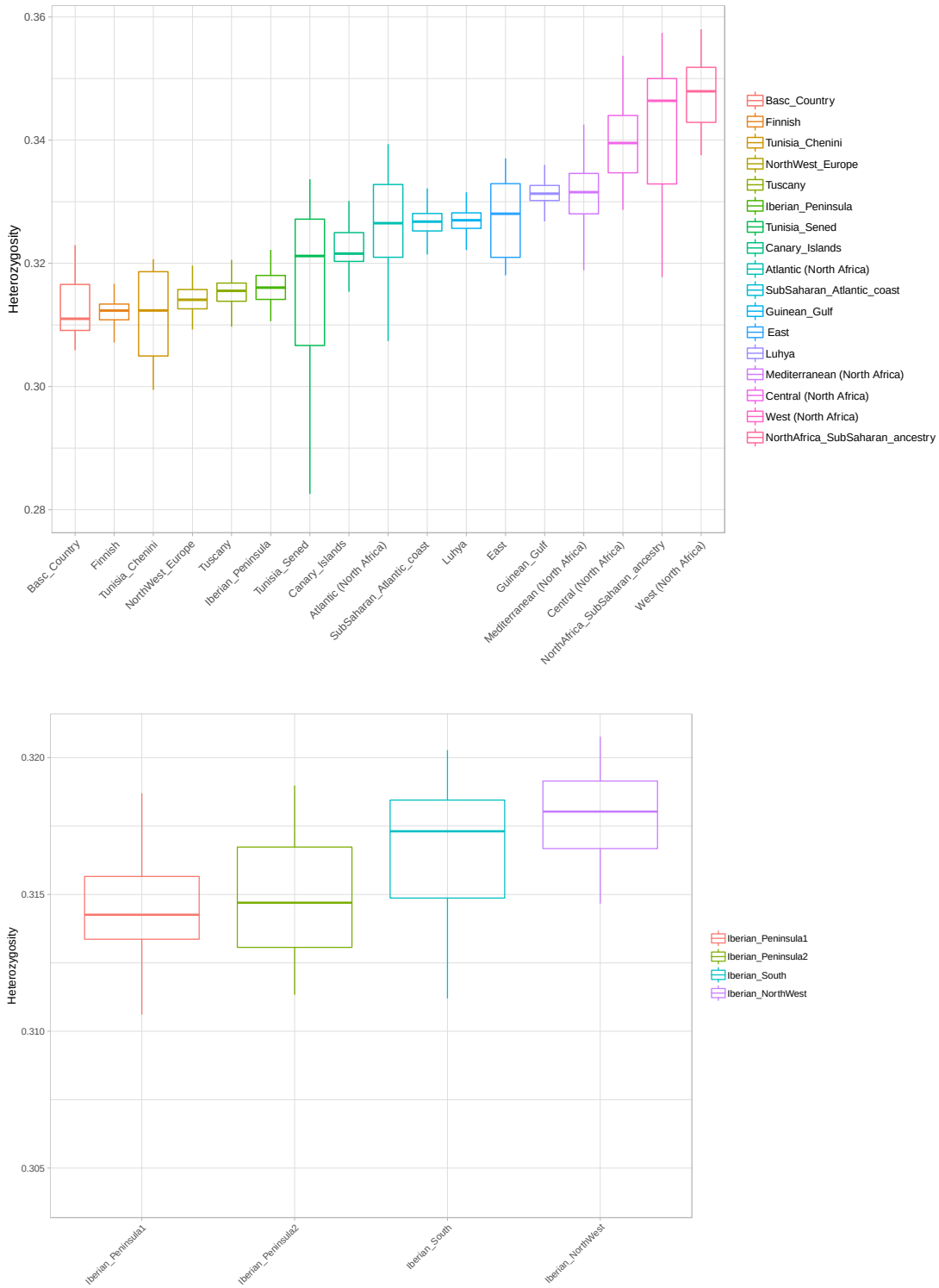
S5 Figure. Density plot for the good of fitness for two admixture events estimated after 100 bootstrap iterations of Globetrotter. Tuscany shows little support for more than one admixture event, whereas the Canary Islands and Iberia show evidences of multiple events or continuous gene flow. (Dark blue for Tuscany, light blue Iberian_Peninsula and pink Canary_Islands).



S6 Figure. Density plot for the good of fitness for two admixture events estimated after 100 bootstrap iterations of Globetrotter in the minor clusters found in Iberia. Iberian_NorthWest and Iberian_Peninsula2 show little support for more than one admixture event. (Light blue is Iberian_Peninsula2, yellow Ibieran_NorthWest, pink Iberian_Peninsula1 and dark blue Iberian_South).



S7 Figure. Globetrotter estimated curves that explain the multiway admixture signal find in three Iberian subclusters. The same result is found in the three subclusters, the Basque surrogate shows evidences of admixture with both the Atlantic and the Tuscan surrogates, and at the same time the Atlantic and Tuscan surrogates show admixture between them. Then we conclude that the three surrogates represent three different sources or intermixing groups.



S8 Figure. Heterozygosity ratio estimation for each of the clusters in the whole dataset and in the subclusters of the Iberian Peninsula.

Number of samples	Population label	Sampling location	Study	Platform
19	Algeria	Algerian, Alger	Henn et al. 2012	Affymetrix 6.0
20	Algeria_Tim_Ber	Algerian Berbers, Timimoun	Arauna et al. 2017	Affymetrix 6.0
20	Basque	Basque Country, Spain	Botigué et al. 2013	Affymetrix 6.0
17	Canary_Islands	Canary Islands	Botigué et al. 2013	Affymetrix 6.0
99	CEU	Utah residents (CEPH) with Northern and Western European ancestry	1000 genomes project	Mean depth 7.4x
19	Egypt	Egypt	Henn et al. 2012	Affymetrix 6.0
99	ESN	Esan in Nigeria	1000 genomes project	Mean depth 7.4x
99	FIN	Finnish in Finland	1000 genomes project	Mean depth 7.4x
91	GBR	British in England and Scotland	1000 genomes project	Mean depth 7.4x
113	GWD	Gambian in Western Division, The Gambia - Mandinka	1000 genomes project	Mean depth 7.4x
36	Iberia	Andalusian and Galician, Spain	Botigué et al. 2013	Affymetrix 6.0
107	IBS	Iberian populations in Spain	1000 genomes project	Mean depth 7.4x
17	Libya	Libya	Henn et al. 2012	Affymetrix 6.0
99	LWK	Luhya in Webuye, Kenya	1000 genomes project	Mean depth 7.4x
14	Morocco_Err_Ber	Moroccan Berbers, Errachidia	Arauna et al. 2017	Affymetrix 6.0
18	Morocco_N	Moroccan North	Henn et al. 2012	Affymetrix 6.0
16	Morocco_S	Moroccan South	Henn et al. 2012	Affymetrix 6.0
14	Morocco_Tiz_Ber	Moroccan Berbers, Tiznit	Arauna et al. 2017	Affymetrix 6.0
85	MSL	Mende in Sierra Leone	1000 genomes project	Mean depth 7.4x
18	Sahara	Occidental Sahara	Henn et al. 2012	Affymetrix 6.0
19	Syria	Syria	Arauna et al. 2017	Affymetrix 6.0
107	TSI	Toscani in Italy	1000 genomes project	Mean depth 7.4x
18	Tunisia_Chen_Ber	Tunisian Berbers,Chenini	Henn et al. 2012	Affymetrix 6.0
17	Tunisia_Sen_Ber	Tunisian Berbers, Sened	Arauna et al. 2017	Affymetrix 6.0
108	YRI	Yoruba in Ibadan, Nigeria	1000 genomes project	Mean depth 7.4x
1289	Total			
	Total number of SNPs	267475		

ChromoPainter dataset	
28	Basque
38	Atlantic
17	Canary_Islands
17	Central
24	East
99	Finn
207	Guinean_Gulf
128	Iberian_Peninsula
99	Luhya
53	Mediterranean
18	NorthAfrica_SubSaharan_ancestry
190	NorthWest_Europe
198	SubSaharan_Atlantic_coast
18	Tunisia_Chenini
14	Tunisia_Sened
107	Tuscany
14	West
1269	Total

		Number of SNPs
Datasets filtered (missing SNPs 10%, HWE 0.01)	North Africa	486252
	Spain	788986
	Canary	791058
	1000genomes	81954999
After merge		539305
After MAF 0.05		267475
After LD pruning		149956
Methods	Haplotype based (ChromoPainter, FineSTRUCTURE and GLOEBTROTTER)	267475
	Allele frequency dependent (PCA, diversity measures)	149956

Table S1. Dataset description. The above table show the information of the samples, including geographical origin, the study from where the data was obtained and number of samples. The second table shows the number of samples for each fineSTRUCTURE cluster that has been used for most of the analyses. The third table shows the number of SNPs at each step of the analyses.

Tuscany	One-date	CI 466-504 CE	Mean 485 CE				
Minor source	Total proportion	Mediterranean	Iberian_Peninsula	Basque	Luhya	Tunisia_Chenini	
	0,330	0,162	0,147	0,012	0,007	0,002	
Major source	Total proportion	NorthWest_Europe	Iberian_Peninsula	Finn			
	0,670	0,380	0,262	0,028			

Iberian_Peninsula	One-date multiway	CI 990-1009 CE	Mean 1000 CE			
Source 1	Total proportion	Mediterranean	Atlantic	West	Tunisia_Chenini	Luhya
	0,183	0,145	0,014	0,013	0,002	0,010
Source 2	Total proportion	NorthWest_Europe	Tuscany	Finn		
	0,653	0,424	0,213	0,016		
Source 3	Total proportion	Basque				
	0,164	0,164				

Canary_Islands	One-date	CI 1546-1562 CE	Mean 1555 CE			
Minor source	Total proportion	Atlantic	SubSaharan_Atlantic	Tunisia_Chenini	Guinean_Gulf	Tunisia_Sened
	0,115	0,055	0,038	0,008	0,007	0,006
Major source	Total proportion	Iberian_Peninsula	NorthWest_Europe	Tuscany	Finn	Basque
	0,885	0,636	0,138	0,090	0,011	0,010

Table S2. Globetrotter results for the first analysis of Iberia, Tuscany and Canary Islands. The table joins the information of the globetrotter summary output and a detailed analysis of the coancestry curves.

Iberian_NorthWest	One-date	CI 717-759 CE	Mean 738 CE							
Minor Source	Total proportion	West	Mediterranean	Tunisia_Chenini	Luhya					
	0,142	0,074	0,058	0,008	0,003					
Major Source	Total proportion	NorthWest_Europe	Iberian_Peninsula1	Iberian_Peninsula2	Tuscany	Finn	Basque			
	0,858	0,335	0,215	0,173	0,111	0,018	0,005			

Iberian_Peninsula1	One-date multiway	CI 1027-1058 CE	Mean 1042 CE							
Source 1	Total proportion	Mediterranean	Atlantic	East	Tunisia_Sened	Luhya				
	0,203	0,153	0,021	0,019	0,009	0,001				
Source 2	Total proportion	NorthWest_Europe	Tuscany	Iberian_Peninsula2	Finn					
	0,489	0,295	0,134	0,055	0,005					
Source3	Total proportion	Basque								
	0,307	0,307								

Iberian_Peninsula2	One-date multiway	CI 734-778 CE	Mean 756 CE							
Source 1	Total proportion	Mediterranean	West	Atlantic	Tunisia_Sened	Tunisia_Chenini				
	0,135	0,057	0,057	0,013	0,008	0,000				
Source 2	Total proportion	NorthWest_Europe	Iberian_Peninsula1	Tuscany	Finn					
	0,810	0,360	0,292	0,144	0,015					
Source3	Total proportion	Basque								
	0,055	0,055								

Iberian_South	One-date multiway	CI 1330-1356 CE	Mean 1343 CE							
Source 1	Total proportion	East	Mediterranean	Tunisia_Sened	SubSaharan_Atlantic	West	Atlantic	Tunisia_Chenini	Luhya	
	0,123	0,035	0,027	0,017	0,013	0,010	0,009	0,006	0,006	
Source 2	Total proportion	Iberian_Peninsula1	NorthWest_Europe	Tuscany	Finn					
	0,813	0,51684174	0,201455846	0,081731257	0,012859488					
Source3	Total proportion	Basque								
	0,064	0,064								

Table S3. Globetrotter results for the second analysis of Iberian subclusters: Iberian_Peninsula1, Iberian_Peninsla2, Iberian_Nortwest and Iberian_South. The table joins the information of the globetrotter summary output and a detailed analysis of the coancestry curves.

North African clusters

East				Mediterranean				Central				West				NorthAfrica_SubSaharan_ancestry				Atlantic			
N.indiv	% contribution to the cluster	% from geographical populations	Geographical population	N.indiv	% contribution to the cluster	% from geographical populations	Geographical population	N.indiv	% contribution to the cluster	% from geographical populations	Geographical population	N.indiv	% contribution to the cluster	% from geographical populations	Geographical population	N.indiv	% contribution to the cluster	% from geographical populations	Geographical population	N.indiv	% contribution to the cluster	% from geographical populations	Geographical population
18	69,23	94,74	Egypt	18	33,96	100,00	Morocco_N	5	29,41	35,71	Morocco_Err_Ber	5	35,71	31,25	Morocco_S	12	66,67	60,00	Algeria_Tim_Ber	16	42,11	88,89	Sahara
6	23,08	31,58	Syria	14	26,42	73,68	Algeria	4	23,53	20,00	Algeria_Tim_Ber	3	21,43	15,00	Algeria_Tim_Ber	4	22,22	25,00	Morocco_S	11	28,95	78,57	Morocco_Tiz_Ber
2	7,69	5,56	Iberia	14	26,42	82,35	Libya	3	17,65	15,79	Algeria	2	14,29	10,53	Algeria	1	5,56	7,14	Morocco_Tiz_Ber	7	18,42	50,00	Morocco_Err_Ber
				3	5,66	17,65	Tunisia_Sen_Ber	3	17,65	17,65	Libya	2	14,29	14,29	Morocco_Tiz_Ber	1	5,56	5,56	Sahara	4	10,53	25,00	Morocco_S
				2	3,77	12,50	Morocco__S	1	5,88	0,19	Egypt	1	7,14	7,14	Morocco_Err_Ber								
				1	1,89	5,00	Algeria_Tim_Ber	1	5,88	6,25	Morocco_S	1	7,14	5,56	Sahara								
				1	1,89	7,14	Morocco_Err_Ber																

North African clusters

Tunisia_Chenini				Tunisia_Sened			
N.indiv	% contribution to the cluster	% from geographical populations	Geographical population	N.indiv	% contribution to the cluster	% from geographical populations	Geographical population
18	100,00	100,00	Tunisia_Chen_Ber	14	100,00	82,35	Tunisia_Sen_Ber

European clusters

Iberian_Peninsula				Tuscany				Basque				Canary_Islands				NorthWest_Europe				Finn			
N.indiv	% contribution to the cluster	% from geographical populations	Geographical population	N.indiv	% contribution to the cluster	% from geographical populations	Geographical population	N.indiv	% contribution to the cluster	% from geographical populations	Geographical population	N.indiv	% contribution to the cluster	% from geographical populations	Geographical population	N.indiv	% contribution to the cluster	% from geographical populations	Geographical population	N.indiv	% contribution to the cluster	% from geographical populations	Geographical population
94	73,44	38,30	IBS	107	100,00	100,00	TSI	20	71,43	100,00	Spain_Basque	17	48,57	100,00	Canary_Islands	99	52,11	100,00	CEU	99	100,00	100,00	FIN
34	26,56	94,44	Iberia					8	28,57	7,48	IBS	13	37,14	68,42	Syria	91	47,89	100,00	GBR				

Sub-Saharan Africa clusters

Luhya				SubSaharan_Atlantic_coast				Guinean_Gulf			
N.indiv	% contribution to the cluster	% from geographical populations	Geographical population	N.indiv	% contribution to the cluster	% from geographical populations	Geographical population	N.indiv	% contribution to the cluster	% from geographical populations	Geographical population
99	100,00	100,00	LWK	113	57,07	100,00	GWD	108	52,17	100,00	YRI
				85	42,93	100,00	MSL	99	47,83	100,00	ESN

Iberian_Peninsula sublusters

Iberian_NorthWest		Iberian_Peninsula1		Iberian_Peninsula2		Iberian_South	
20	Galicia	7	Unknown*	18	Unknown*	15	Andalucia
2	Andalucia	5	Aragon*	4	Catalunya*	14	Unknown*
2	Unknown*	5	Cantabria*	3	Belearic_Islands*	4	Extremadura*
1	Balearic Islands*	5	Castilla_la_Mancha*	2	Galicia	3	Castilla_y_Leon*
		4	Valencia*	1	Aragon*	3	Murcia*
		3	Andalucia	1	Valencia*		
		2	Castilla_y_Leon*				
		1	Catalunya*				
		1	Extremadura*				
		1	Murcia*				

*IBS from1000genomes

Table S4. FineSTRUCTURE inferred clusters and the number and origin of the samples belonging to each of them. N.ind: Number of individuals from each geographical population in the cluster. % contribution to the cluster: percentage that each geographical population contributes to the cluster. % from geographical populations: percentage of individuals that are present in the cluster from the total geographical populations.