

Supplementary Materials

Table S1. 233 individuals of Chinese fir from generation 1 to generation 4 used in this trial.

Classification	Source and germplasm number	Quantity
G1	F12、E139	2
G2	E154、E149、E153、E157、F13、E156、E147、E71、E69、E136、 E50、E103、E150、E72、E90、A3、B9、C7、C11、E35、 E9、E10、C5、C4、E44、B11、E158、E159、F7、E49、 E152、E148、E110、E137、E130、A6、E16、E25、A1、A5、 E43、E23、E11、E151、E155、E7、E67、E111、E56、C2、 E119、E17、E73、E105、E66、E124	56
G3	B3、E14、E126、E40、E112、E95、E143、E18、E113、E86、 E134、C20、E97、E146、E127、C30、C23、E1、C34、E85、 E98、E141、E70、C36、E54、E94、E89、C31、E82、E145、 E51、E65、E38、E5、E78、E129、C33、E99、B10、E81、 B13、B8、C25、E68、E125、C27、C12、E93、E47、E102、 C15、E132、C37、C9、A2、E34、E42、C32、E114、F5、 E26、E88、F2、E74、F15、E41、E64、E133、E28、E122、 E21、E20、E13、E22、A7、E118、E96、E75、E108、E135、 E63、E6、E104、C3、E52、E117、E48、C19、E91、F9、 E12、F14、E55、E59、C18、E27、E62、E57、B12、E8、 C10、E79、C14、E24、C16、F3、E19、E15、C13、E83、 C26、E115、E101、E107、C21、C35、C22、C29、C38、E123、 E121、E116、E109、E87、C28、C8、C24、C6、F10、F11、 E140、E106、E84、E100、A4、E131、E76、E4、E142、E80、 E138、E77、E120、E92、E128、E144	146
G4	E46、F4、E37、C1、F1、B2、E39、B1、F8、E58、 E53、E33、B5、B6、B4、C17、E36、B7、E29、E30、 F6、E31、E32、F16、E60、E45、E2、E3、E6	29
Total	The 4 th cycle of Chinese fir breeding population	233

Note: G1~G4 represent the 1st, 2nd, 3rd and 4th generation breeding parents, respectively.

Table S2. Basic information of 31 progeny trials from breeding cycles two and three.

Trial	Planting year	Cycle	Cross type	No of families	Location	Latitude and longitude	Experimental design	Plot tree	Repetition
1	1988	2	OP	127	Yangkou	26°49'N, 117°53'E	Randomized incomplete block	4	10
2	1988	2	OP	127	Guanzhuang	26°32'N, 117°45'E	Randomized incomplete block	4	10
3	1989	2	OP	238	Yangkou	26°49'N, 117°53'E	Randomized complete block	4	10
4	1989	2	OP	238	Guanzhuang	26°32'N, 117°45'E	Randomized complete block	4	10
5	1990	2	OP	41	Yangkou	26°49'N, 117°53'E	Randomized incomplete block	10	3
6	1990	2	OP	41	Guanzhuang	26°32'N, 117°45'E	Randomized incomplete block	10	3
7	1991	2	OP	237	Yangkou	26°49'N, 117°53'E	Randomized incomplete block	4	10
8	1991	2	OP	237	Guanzhuang	26°32'N, 117°45'E	Randomized incomplete block	4	10
9	1992	2	OP	207	Yangkou	26°49'N, 117°53'E	Randomized complete block	4	12
10	1992	2	OP	207	Guanzhuang	26°32'N, 117°45'E	Randomized complete block	4	12
11	1994	2	OP	44	Yangkou	26°49'N, 117°53'E	Randomized complete block	4	10
12	1994	2	OP	44	Guanzhuang	26°32'N, 117°45'E	Randomized complete block	4	10
13	2003	2	OP	81	Weimin	27°05'N, 117°40'E	Randomized complete block	4	10
14	2003	2	OP	81	Guanzhuang	26°32'N, 117°45'E	Randomized complete block	4	10
15	2003	2	OP	81	Xikou	25°36'N, 118°69'E	Randomized complete block	4	10
16	2003	2	OP	81	Yangkou	26°49'N, 117°53'E	Randomized complete block	4	10
17	2005	2	OP	79	Guanzhuang	26°32'N, 117°45'E	Randomized complete block	4	10
18	2005	2	OP	79	Yangkou	26°49'N, 117°53'E	Randomized complete block	4	10
19	2008	3	OP	102	Guanzhuang	26°32'N, 117°45'E	Randomized complete block	4	10
20	2008	3	OP	102	Weimin	27°05'N, 117°40'E	Randomized complete block	4	10
21	2008	3	OP	102	Youxi	26°10'N, 118°11'E	Randomized complete block	4	10
22	2008	3	OP	92	Yangkou	26°49'N, 117°53'E	Randomized complete block	4	10

Trial	Planting year	Cycle	Cross type	No of families	Location	Latitude and longitude	Experimental design	Plot tree	Repetition
23	2008	3	OP	92	Guanzhuang	26°32'N, 117°45'E	Randomized complete block	4	10
24	2008	3	OP	92	Jiangle	26°43'N, 117°28'E	Randomized complete block	4	10
25	2010	3	OP	168	Yangkou	26°49'N, 117°53'E	Randomized complete block	4	10
26	2010	3	OP	168	Guanzhuang	26°32'N, 117°45'E	Randomized complete block	4	10
27	2010	3	OP	168	Weimin	27°05'N, 117°40'E	Randomized complete block	4	10
28	2011	3	OP	112	Yangkou	26°49'N, 117°53'E	Randomized complete block	5	10
29	2011	3	OP	112	Guanzhuang	26°32'N, 117°45'E	Randomized complete block	5	10
30	2011	3	OP	112	Jiangle	26°43'N, 117°28'E	Randomized complete block	5	10
31	2011	3	CP	112	Youxi	26°10'N, 118°11'E	Randomized complete block	5	10

Note: Yangkou, Guanzhuang, Weimin, Xikou, Jiangle, Youxi are State-owned Forest Farm of Fujian Province

CP: control-pollinated

OP: open-pollinated

Table S3. T-test results of core subpopulation.

Core Collection	Phenotype	T-value	F-value
S-60%	HGW	-1.114	0.266
	DBH	2.408	0.17
	WBD	-1.243	0.215
MP1-70%	HGW	14.554	0
	DBH	-1.079	0.282
	WBD	-1.497	0.136
MP2-60%	HGW	-1.609	0.109
	DBH	18.922	0
	WBD	4.933	0
MP3-70%	HGW	-1.652	0.1
	DBH	15.761	0
	WBD	3.104	0.004
CP	HGW	1.89	0.04
	DBH	5.734	0
	WBD	2.658	0.008

Note: CP, core population

Table S4. Pearson correlations between HGW, DBH and WBD

Trait	HGW	DBH	WBD
HGW		0.162	0.039
DBH	-0.092		0.000
WBD	-0.135*	0.328**	

Note: The diagonal below represents Pearson correlation, and the diagonal above represents the P-value. * represents $P < 0.05$. ** represents $P < 0.01$.

Table S5. Genetic gain of phenotypic traits of various quality resources in the core population.

ID	HGW/g	DBH/cm	WD/(kg/m3)	ΔG HGW	ΔG DBH	ΔG WBD	Population
B13	1.088	21.8	337.3	91.20%	-6.45%	3.19%	MP1
C22	0.748	28.5	348.2	31.45%	22.30%	6.52%	MP1
C25	0.57	24.4	317.8	0.17%	4.70%	-2.78%	MP2
C28	0.879	24.4	304.8	54.47%	4.70%	-6.76%	MP1
C29	0.512	23.3	345.2	-10.02%	-0.02%	5.60%	MP3
C30	0.682	25.7	375.17	19.85%	10.28%	14.77%	MP3
E100	0.598	22.4	329.2	5.09%	-3.88%	0.71%	MP1
E105	0.64	29.3	335.45	12.47%	25.73%	2.62%	MP1
E106	0.639	28.3	318.31	12.29%	21.44%	-2.62%	MP1
E110	0.604	26.9	361.49	6.14%	15.43%	10.59%	MP3
E111	0.593	27.6	354.2	4.21%	18.44%	8.36%	MP3
E114	0.789	25.1	373.63	38.65%	7.71%	14.30%	MP1
E118	0.666	27.8	309.02	17.04%	19.29%	-5.47%	MP1
E121	0.649	24.2	311.18	14.05%	3.85%	-4.81%	MP1
E123	0.583	32.2	358.25	2.45%	38.18%	9.59%	MP2
E124	0.576	27.2	308.63	1.22%	16.72%	-5.58%	MP2
E126	0.627	27.5	304.15	10.19%	18.01%	-6.96%	MP1
E129	0.501	28	318.14	-11.96%	20.15%	-2.68%	MP2
E131	0.666	25.3	374.94	17.04%	8.57%	14.70%	MP3
E136	0.502	23.1	358.25	-11.78%	-0.87%	9.59%	MP3
E141	0.699	22.3	328.4	22.84%	-4.31%	0.46%	MP1
E143	0.52	22.1	305.6	-8.62%	-5.17%	-6.51%	MP2
E144	0.677	25.3	332.5	18.97%	8.57%	1.72%	MP1
E147	0.748	34.3	349.94	31.45%	47.19%	7.05%	MP1
E149	0.592	34.6	323.71	4.04%	48.47%	-0.97%	MP2
E150	0.486	33.2	371.71	-14.59%	42.47%	13.71%	MP3
E151	0.645	32.7	451.39	13.35%	40.32%	38.09%	MP3
E152	0.718	36.4	367.42	26.18%	56.20%	12.40%	MP2
E153	0.511	35.4	437.82	-10.20%	51.91%	33.94%	MP3
E154	0.507	37.4	404.15	-10.90%	60.49%	23.64%	MP3
E155	0.587	34.1	322.1	3.16%	46.33%	-1.46%	MP2
E156	0.599	43.5	309.65	5.27%	86.67%	-5.27%	MP2
E157	0.518	29.7	387.27	-8.97%	27.45%	18.47%	MP3
E158	0.698	44.3	415.19	22.66%	90.10%	27.01%	MP2
E25	0.583	25.4	314.73	2.45%	9.00%	-3.72%	MP1
E31	0.484	22.8	314.03	-14.94%	-2.16%	-3.93%	MP2
E39	0.71	23.8	342.62	24.77%	2.13%	4.81%	MP1
E42	0.509	21.6	307.62	-10.55%	-7.31%	-5.89%	MP3

E44	0.565	23.9	307.25	-0.71%	2.56%	-6.01%	MP2
E60	0.696	21.4	342.53	22.31%	-8.17%	4.79%	MP1
E66	0.512	30.4	340	-10.02%	30.45%	4.01%	MP3
E67	0.499	30.2	326.5	-12.31%	29.59%	-0.12%	MP2
E68	0.499	28.6	361.5	-12.31%	22.73%	10.59%	MP3
E76	0.521	24.5	385.9	-8.44%	5.13%	18.05%	MP3
E79	0.558	27.1	309.9	-1.94%	16.29%	-5.20%	MP2
E83	0.649	23.6	308.7	14.05%	1.27%	-5.56%	MP1
E87	0.537	25.5	369.5	-5.63%	9.42%	13.04%	MP3
E92	0.526	26.1	321.7	-7.56%	12.00%	-1.59%	MP2
E93	0.503	25.4	344.3	-11.61%	9.00%	5.33%	MP3
E98	0.614	30.5	337.6	7.90%	30.88%	3.28%	MP2

Table S6. Pedigree relationship 233 individuals.

Relationship	The number of relationship pairs
0.5	32
0.25	245
0.125	98
0.0625	1156
0.03125	557
0.015625	43
0	27028

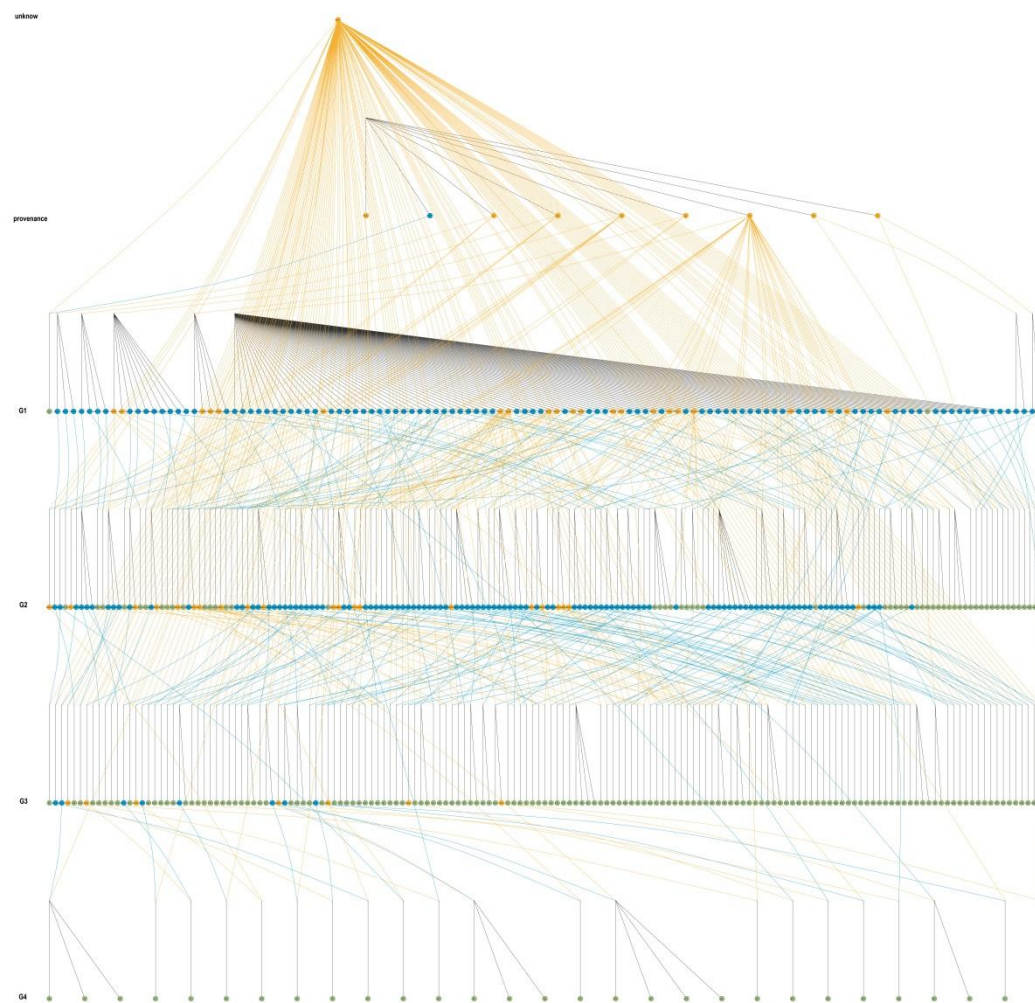


Figure S1. Pedigree analysis of 233 individuals.

Note: Three colored dots were used: blue for male, yellow for female, and green for gender unknown. The green dots represent the 233 individuals in the study. The top is the ancestor individual and the bottom is the descendant individual. Parents and offspring are connected through a point, and the line between the offspring and the middle node is dark gray. The middle node connects the lines of the male and the female, which are the same color as the parent.

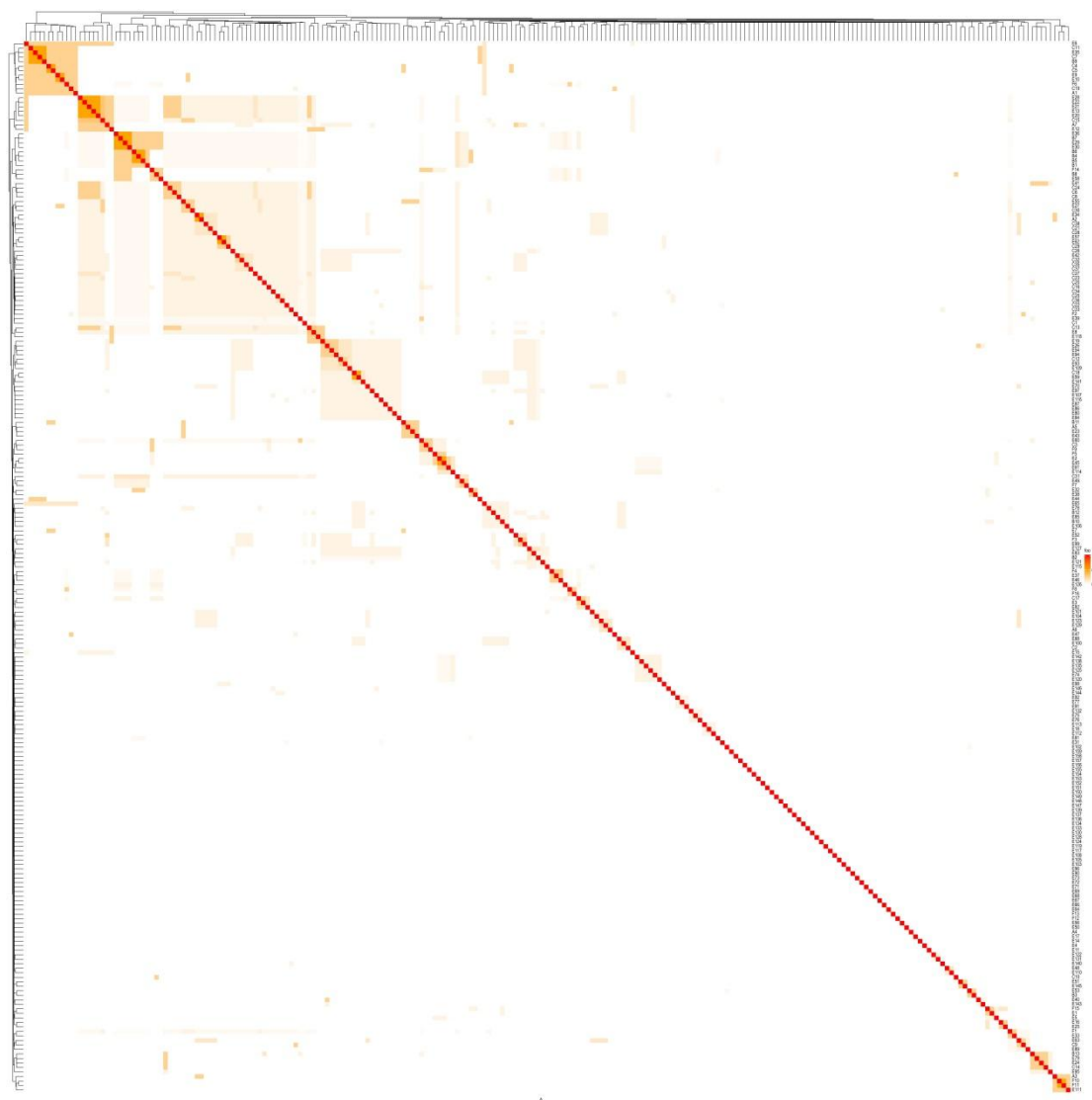


Figure S2. Kinship based on pedigree of the 233 individuals.

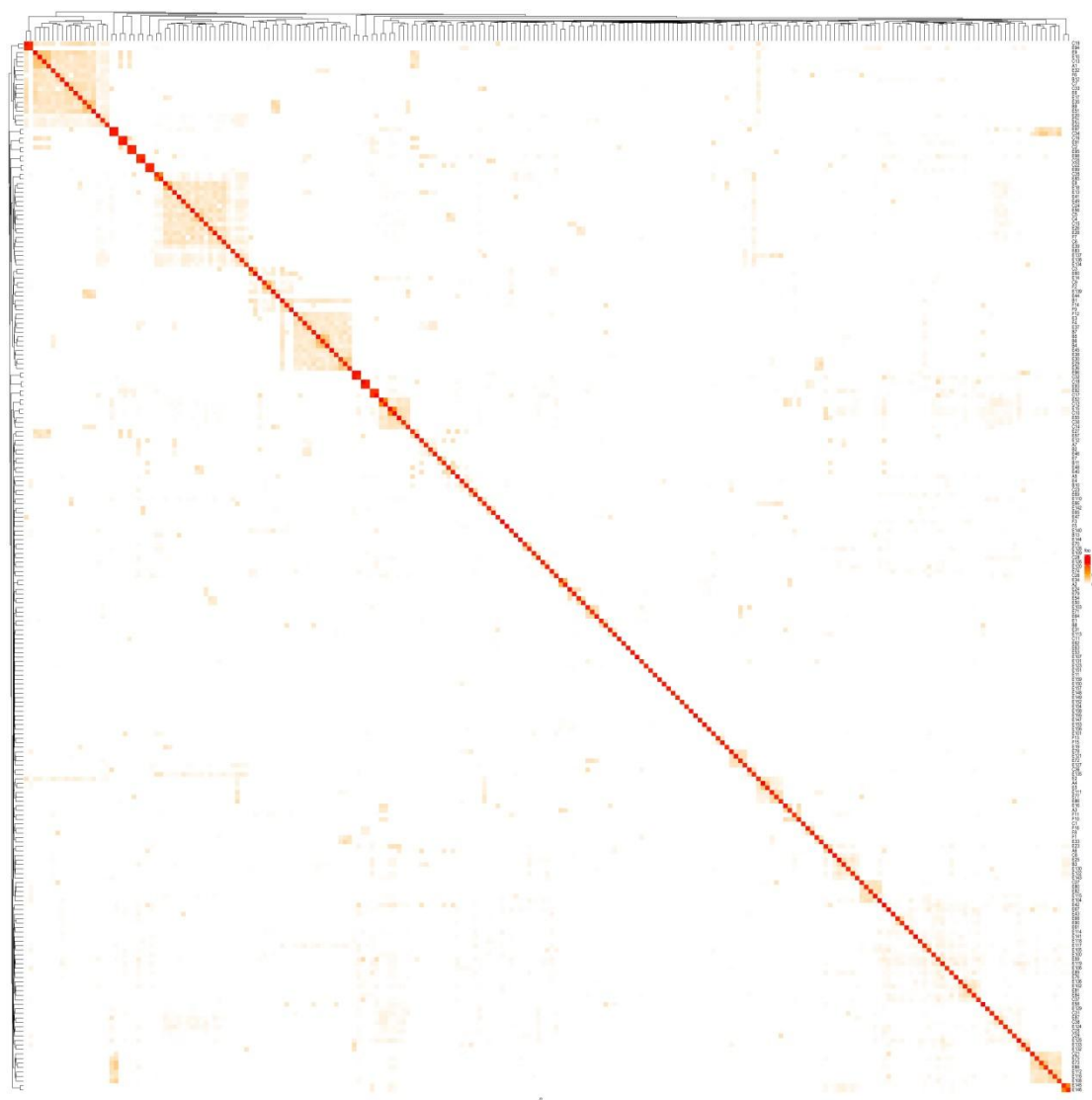


Figure S3. Kinship based on molecular of the 233 individuals.

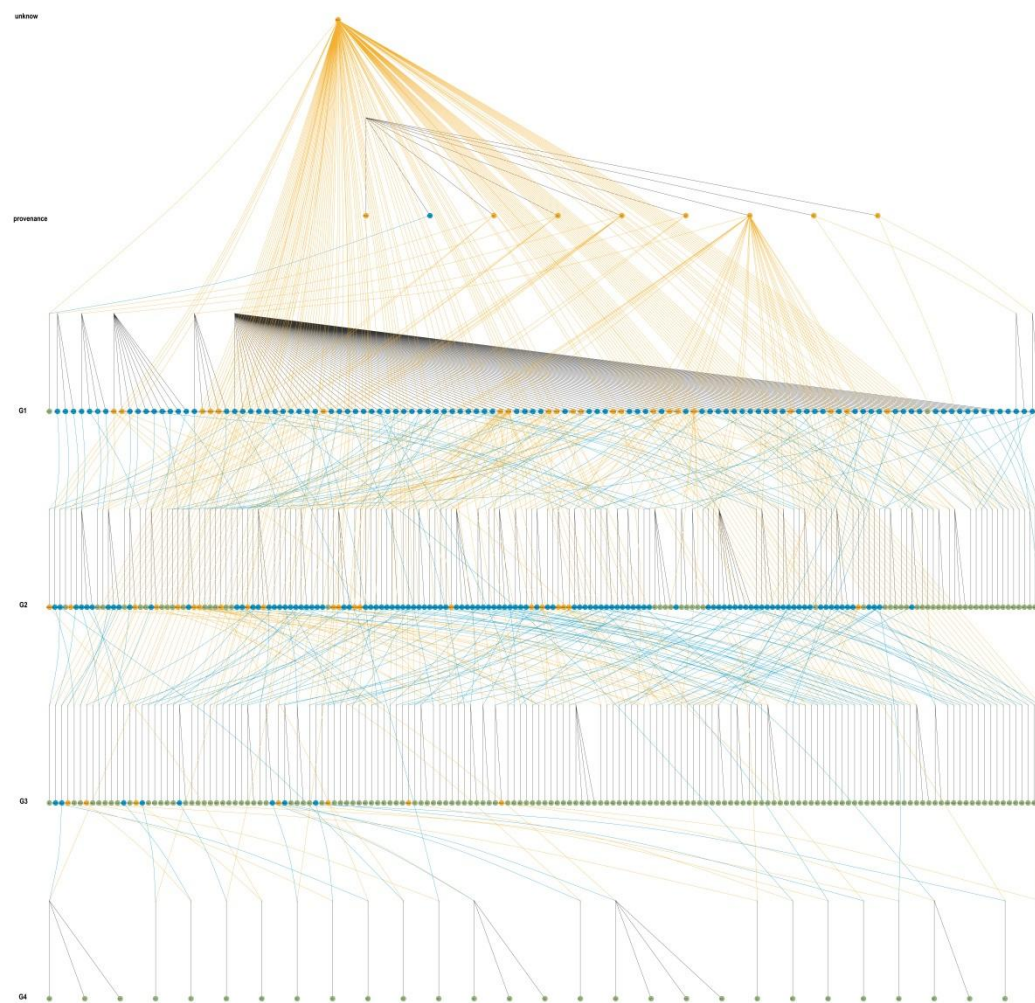


Figure S4. Pedigree analysis of 50 individuals.

Note: Three colored dots were used: blue for male, yellow for female, and green for gender unknown. The green dots represent the 50 individuals in the study. The top is the ancestor and the bottom is the descendant individual. Parents and offspring are connected through a point, and the line between the offspring and the middle node is dark gray. The middle node connects the lines of the male and the female, which are the same color as the parent.