GENOSTRUCT

A T C G A T C G

Mesolithic & Neolithic Ancestry Model Report

This report fits your profile using Mesolithic and Neolithic reference populations.

Target: **Sardinian**
Reference panel: 1240k sites
SNPs matched: 1,138,275 / 1,233,013 (92.3%)
Generated: 2026-03-11

Fit Quality: Very Good

The best model fits very well across tested alternatives.

Top Model Composition

Best-fit Mesolithic/Neolithic reference mixture.

Broad geographic groupings of your ancestry

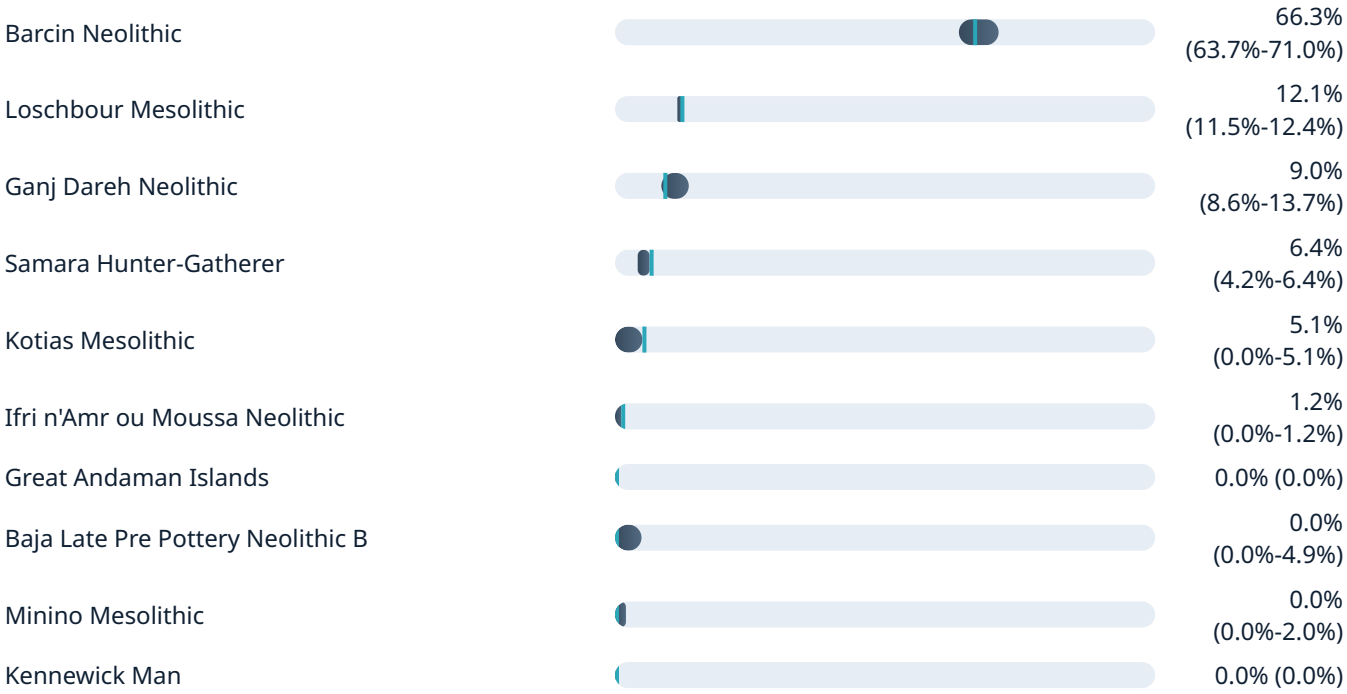
- Anatolian Neolithic 66.3%
- Western Hunter-Gatherer 12.1%
- Zagros Neolithic 9.0%
- Eastern Hunter-Gatherer 6.4%
- Caucasus Hunter-Gatherer 5.1%
- North and East African Neolithic 1.2%

Specific ancient populations used to model your profile

Barcin Neolithic	66.3%
Loschbour Mesolithic	12.1%
Ganj Dareh Neolithic	9.0%
Samara Hunter-Gatherer	6.4%
Kotias Mesolithic	5.1%
Ifri n'Amr ou Moussa Neolithic	1.2%

Range & Stability Across Top Models

Dark band = likely range across top 4 models. Teal marker = best model point estimate.



Component Summary

COMPONENT	BEST	CONSENSUS	LIKELY RANGE	STABILITY
Barcin Neolithic	66.3%	66.9%	63.7%-71.0%	Stable
Loschbour Mesolithic	12.1%	12.0%	11.5%-12.4%	Stable
Ganj Dareh Neolithic	9.0%	11.0%	8.6%-13.7%	Stable
Samara Hunter-Gatherer	6.4%	5.3%	4.2%-6.4%	Stable
Kotias Mesolithic	5.1%	2.5%	0.0%-5.1%	Stable
Ifri n'Amr ou Moussa Neolithic	1.2%	0.6%	0.0%-1.2%	Stable
Great Andaman Islands	0.0%	0.0%	0.0%	Stable
Baja Late Pre Pottery Neolithic B	0.0%	1.2%	0.0%-4.9%	Stable
Minino Mesolithic	0.0%	0.5%	0.0%-2.0%	Stable
Kennewick Man	0.0%	0.0%	0.0%	Stable

Model Comparison (Top 4)

Lower RMSE/WRMSE and lower Max |Z| are better. Positive deltas are worse than Model #1.

MODEL	SOURCE SCENARIO	WRMSE ↓	DELTA WRMSE	MAX |Z| ↓	DELTA MAX |Z|	CONSUMER READ
Model #1	Barcin Neolithic + Loschbour Mesolithic + Samara Hunter-Gatherer + Ifri n'Amr ou Moussa Neolithic + Kotias Mesolithic + Ganj Dareh Neolithic	0.648	**+0.000**	2.16	**+0.00**	Best overall fit in this run.
Model #2	Barcin Neolithic + Loschbour Mesolithic + Samara Hunter-Gatherer + Ifri n'Amr ou Moussa Neolithic + Minino Mesolithic + Ganj Dareh Neolithic	0.649	**+0.001**	2.19	**+0.04**	Close alternative with similar fit.
Model #3	Barcin Neolithic + Loschbour Mesolithic + Samara Hunter-Gatherer + Kotias Mesolithic + Ganj Dareh Neolithic + Baja Late Pre Pottery Neolithic B	0.650	**+0.002**	2.13	-0.03	Close alternative with similar fit.
Model #4	Barcin Neolithic + Loschbour Mesolithic + Samara Hunter-Gatherer + Kennewick Man + Ganj Dareh Neolithic + Great Andaman Islands	0.652	**+0.004**	2.19	**+0.04**	Close alternative with similar fit.

Component Matrix by Model

Highlighted cells mark the highest share for a component across the top models.

COMPONENT	MODEL #1	MODEL #2	MODEL #3	MODEL #4
Barcin Neolithic	66.3%	66.7%	63.7%	**71.0%**
Loschbour Mesolithic	12.1%	**12.4%**	11.9%	11.5%
Ganj Dareh Neolithic	9.0%	**13.7%**	8.6%	12.7%
Samara Hunter-Gatherer	**6.4%**	4.2%	6.1%	4.7%
Kotias Mesolithic	**5.1%**	0.0%	4.9%	0.0%
Ifri n'Amr ou Moussa Neolithic	**1.2%**	1.1%	0.0%	0.0%
Baja Late Pre Pottery Neolithic B	0.0%	0.0%	**4.9%**	0.0%
Minino Mesolithic	0.0%	**2.0%**	0.0%	0.0%

Archaeological Context (Top Model)

ANATOLIAN NEOLITHIC

Barcin Hoyuk

Barcin Neolithic | Top model share: 66.3%

LOCATION Marmara, Turkey

PERIOD c. 6400–6000 calBCE

Barcın Höyük is among the earliest Neolithic settlements in northwestern Anatolia, situated on the shore of Lake İznik. Its community practised mixed agropastoral subsistence, and genomic evidence from this site has been central to characterising the Anatolian Neolithic gene pool that spread into Europe.

WESTERN HUNTER-GATHERER

Loschbour Rock Shelter

Loschbour Mesolithic | Top model share: 12.1%

LOCATION Müllerthal, Luxembourg

PERIOD c. 6100–5900 calBCE

Loschbour is one of the classic reference genomes for Western Hunter-Gatherer (WHG) ancestry in Europe, recovered from a rock shelter in Luxembourg. WHG ancestry formed a major component of pre-Neolithic European populations and persisted through admixture with incoming Anatolian Neolithic farmers.

ZAGROS NEOLITHIC

Ganj Dareh

Ganj Dareh Neolithic | Top model share: 9.0%

LOCATION Kermanshah Province, Iran

PERIOD c. 8200–7600 BCE

Ganj Dareh is one of the earliest Neolithic settlements in the Zagros Mountains of western Iran, with evidence for early goat herding. Individuals belong to an early Iranian Neolithic lineage genetically distinct from both Anatolian Neolithic farmers and Caucasus Hunter-Gatherers.

EASTERN HUNTER-GATHERER

Lebyazhinka-4

Samara Hunter-Gatherer | Top model share: 6.4%

LOCATION Samara, Russia

PERIOD c. 5660–5535 calBCE

Lebyazhinka-4 is a burial site in the Samara region of the middle Volga representing Neolithic foragers of the Eastern European forest-steppe. Individuals are classified as Eastern Hunter-Gatherers and represent the local forager substrate predating Bronze Age steppe pastoralism.

CAUCASUS HUNTER-GATHERER

Kotias Klde

Kotias Mesolithic | Top model share: 5.1%

LOCATION Georgia

PERIOD c. 7940–7599 calBCE

Kotias Klde is a rock shelter in western Georgia that yielded one of the classic reference genomes for Caucasus Hunter-Gatherer (CHG) ancestry. CHG is distinct from both Anatolian Neolithic and Iranian Neolithic lineages, and later contributed to Early Bronze Age steppe populations, giving it broad downstream presence across Eurasia.

NORTH AND EAST AFRICAN NEOLITHIC

Ifri n'Amr ou Moussa

Ifri n'Amr ou Moussa Neolithic | Top model share: 1.2%

LOCATION	Khemisset region, Morocco
PERIOD	c. 5200–4900 calBCE

Ifri n'Amr ou Moussa is a cave in northern Morocco yielding some of the earliest Neolithic genomic data from northwestern Africa. Individuals derive almost entirely from local Maghrebi ancestry continuous with earlier North African populations, predating the stronger Levant-related input seen in later North African groups.

Supplementary Technical Appendix

RMSE (lower is better)

8.835263e-04

Condition #

9.33

CONSTRAINT CHECK

mass 0.000, neg 0

Low

dWRMSE +0.0153

MISFIT TENSION

max |Z| 2.16

Moderate

Key unresolved rows

LOO LEVERAGE

max dWRMSE 0.099

High

At least one outgroup is carrying substantial identifying signal.

Constraint Check

Negative Mass

0.000

Negative Count

0

dWRMSE (signed)

0.0153

Top Misfit Rows

Rows with the largest signed residual Z values. +Z means this row's observed statistic is higher than model-predicted; -Z means lower.

OUTGROUP	REF	Z	SIGNAL	SE	RESIDUAL
Mbuti	Barcin Neolithic	-2.16	Suggestive	1.847694e-04	-3.983030e-04
Hotu Cave Mesolithic	Barcin Neolithic	2.03	Suggestive	1.123945e-03	2.280130e-03
Mbuti	Loschbour Mesolithic	-1.89	Weak	2.482073e-04	-4.692897e-04
Hotu Cave Mesolithic	Ifri n'Amr ou Moussa Neolithic	1.80	Weak	4.165549e-03	7.514125e-03
Mbuti	Ganj Dareh Neolithic	-1.79	Weak	2.248046e-04	-4.026100e-04
Mbuti	Kotias Mesolithic	-1.74	Weak	2.432946e-04	-4.223824e-04
Hotu Cave Mesolithic	Kotias Mesolithic	1.60	Weak	1.598313e-03	2.550688e-03
Hotu Cave Mesolithic	Loschbour Mesolithic	1.53	Weak	1.560201e-03	2.389392e-03

Outgroup Stress

Which outgroups generated the most tension in the model overall; persistently stressed outgroups may indicate a missing source.

OUTGROUP	MAX |Z|	MEAN |Z|	N ROWS
Mbuti	2.16	1.49	6
Hotu Cave Mesolithic	2.03	1.54	6
Amur River Mesolithic	1.03	0.60	6
Central Anatolia Epipaleolithic	0.99	0.70	6
Malawi 8500BP	0.83	0.69	6
Cameroon Shum Laka	0.82	0.75	6
Iberomaurussian	0.73	0.28	6
Satsurblia	0.70	0.40	6
Natufian	0.66	0.22	6
Hoabinhian Hunter Gatherer	0.61	0.31	6

Leave-One-Out Impact

How much fit changes when each outgroup is removed; larger positive dWRMSE means the dropped outgroup carried more analytical weight.

DROPPED	WRMSE	DWRMSE	MAX |Z|
Mbuti	0.5491	+0.099	2.00
Hotu Cave Mesolithic	0.5589	+0.089	2.15
Yana Upper Paleolithic	0.6614	-0.013	2.16
Jomon Hunter Gatherer	0.6603	-0.012	2.16
MA1 Upper Paleolithic	0.6588	-0.011	2.16
Mesopotamia Pre-Pottery Neolithic A	0.6585	-0.010	2.16
Satsurblia	0.6579	-0.010	2.08
Cameroon Shum Laka	0.6434	+0.005	2.16
Natufian	0.6527	-0.005	2.16
Malawi 8500BP	0.6441	+0.004	2.15