

MIQDASH BETHEL COVENANT INSTITUTION

THE HEBREW RELATION IN THE Y CHROMOSOME

Findings on Jews, Palestinian Arabs, Bedouin, and Kurds

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SOURCE REPORT

Almut Nebel, Dvora Filon, Bernd Brinkmann, Partha P. Majumder, Marina Faerman, and Ariella Oppenheim, *"The Y Chromosome Pool of Jews as Part of the Genetic Landscape of the Middle East,"* American Journal of Human Genetics 69 (2001): 1095–1112. Hebrew University–Hadassah Medical School, Jerusalem.

Sections I–VIII take their figures directly from this report. Section IX adds 13 other DNA studies (2000–2024) that test the same question, with full sources at the end. Where authors offer a hypothesis rather than a result, it is marked as such.

I. THE SHORT ANSWER

The report finds that the **fathers' lines of Jews and Palestinian Arabs come largely from one shared ancient Middle Eastern pool**. The authors' earlier study, summarized in this report, found that **70% of Jewish Y chromosomes and 82% of Palestinian Muslim Arab Y chromosomes** belonged to the same chromosome pool, and they describe this as *"suggesting a common ancestry."*

Three further findings sharpen that picture:

- **Jews are one family genetically.** Ashkenazi, Sephardic, and Kurdish Jews — separated for many centuries — remain closely related, and none of them blended into the nations they lived among.
- **Jews sit closest to the northern Fertile Crescent.** On the father's line, Jews were even closer to Kurds, Turks, and Armenians than to their Arab neighbors — a result the authors themselves called surprising.
- **Palestinian Arabs carry two layers.** An older layer shared with Jews, plus a younger layer of Arab-specific lineages the authors trace to migrations from the Arabian Peninsula within the last two thousand years.

Other studies agree: Ten later and related studies strengthen these findings, including ancient DNA showing that both Jews and Levantine Arabs carry at least half their ancestry from the Bronze Age

people of the land (Cell, 2020), and a dating of the priestly Cohen line to about 3,200 years ago (2009). Three studies add qualifications, chiefly that the Ashkenazi maternal line is largely European. See Section IX.

II. WHO WAS TESTED

The study analyzed **526 Y chromosomes** — the chromosome passed only from father to son — across six populations, using 13 binary markers and six microsatellite (short repeat) markers.

TABLE 1 — THE SIX STUDY POPULATIONS

POPULATION	MEN	PATERNAL ORIGIN
Ashkenazi Jews	79	Europe, from Germany in the west to Russia in the east
Sephardic Jews	78	North Africa (mainly Morocco), Turkey, Iberia, Bulgaria (55); Iraq and Syria (23)
Kurdish Jews	99	Mostly northern Iraq
Muslim Kurds	95	Mostly northern Iraq
Palestinian Arabs	143	Muslim Arabs in Israel and the Palestinian Authority Area
Negev Bedouin	32	Negev desert, southern Israel

Data on Russians, Poles, Byelorussians, Turks, Armenians, Spaniards, Portuguese, North Africans, Syrians, Jordanians, and Lebanese from other studies were added for the wider comparisons.

III. HOW CLOSE JEWS AND PALESTINIANS ARE

The report measures closeness two ways. The first is **FST**, a distance score: the lower the number, the closer two peoples are (0 = identical). The second is the **share of chromosomes** that two groups have in common.

TABLE 2 — GENETIC DISTANCE (FST) BETWEEN GROUPS

PAIR	FST	READING
Kurdish Jews – Sephardic Jews	0.012	No significant difference
Ashkenazi Jews – Muslim Kurds	0.016	Very close
Ashkenazi Jews – Sephardic Jews	0.021	Very close

PAIR	FST	READING
Ashkenazi Jews – Palestinian Arabs	0.026	Close
Kurdish Jews – Palestinian Arabs	0.030	Close
Sephardic Jews – Palestinian Arabs	0.059	Moderate
Palestinian Arabs – Bedouin	0.043	Close
Jews – Bedouin (range)	0.125 – 0.178	Most distant in the study

Shaded rows are the Jewish–Palestinian pairs. Source: report Table 2.

TABLE 3 — SHARE OF Y CHROMOSOMES HELD IN COMMON

	KURDISH JEWS	SEPHARDIC JEWS	ASHKENAZI JEWS	MUSLIM KURDS
Kurdish Jews	—	39.0%	29.2%	31.4%
Sephardic Jews	39.0%	—	38.2%	28.9%
Ashkenazi Jews	29.2%	38.2%	—	34.5%
Palestinian Arabs	19.8%	16.7%	22.5%	16.0%
Bedouin	1.7%	5.5%	9.9%	1.6%

Source: report Table 3 (chromosome proportions). Palestinian Arabs and Bedouin share 21.7% with each other.

What this shows: Jews and Palestinian Arabs are measurably close — Ashkenazi Jews are nearly as close to Palestinians (0.026) as they are to Sephardic Jews (0.021). Yet the three Jewish communities share more chromosomes with Muslim Kurds (29–35%) than with Palestinians (17–23%), and the Negev Bedouin stand apart from all Jewish groups.

IV. JEWS AND THE NORTHERN FERTILE CRESCENT

When the study widened to 14 populations and grouped them, the Jewish group and the **Transcaucasian** group (Muslim Kurds, Armenians, Turks) showed **no statistically significant difference** from each other. Arabs (Palestinians, Syrians, Jordanians, Lebanese, Bedouin) were close but significantly different from both. Eastern Europeans stood far off from all three Middle Eastern groups.

TABLE 4 — DISTANCE BETWEEN POPULATION GROUPS (FCT)

GROUP PAIR	FCT	SIGNIFICANT?
Jews – Transcaucasians	0.006	No (P = .089)
Jews – Arabs	0.062	Yes (P < .001)
Transcaucasians – Arabs	0.079	Yes (P < .001)
Jews – Eastern Europeans	0.215	Yes (P < .001)

Source: report Table 4. About 81% of all variation was within populations; only 18% separated the four groups.

On the 18-population tree, the four Jewish samples **grouped closely with Muslim Kurds and Turks**. The Arab populations, including North Africans, formed their own cluster, and Europeans with Armenians sat at the far end. The authors note this agrees with older protein studies placing most Jewish populations close to Iraqis, who in turn cluster with Kurds, and they tie it to the known cultural links of the Fertile Crescent in early history.

V. THE COHEN MODAL HAPLOTYPE

The single most frequent paternal signature in **all three Jewish communities** was the **Cohen Modal Haplotype (CMH)** — described in earlier research as the signature haplotype of the paternally inherited Jewish priesthood.

- The CMH sits on the **Eu 10** branch — the same branch that carries the three most common Palestinian and Bedouin signatures.
- In the family network of Eu 10, the CMH **occupies the center**, linked to eight neighboring types, which suggests it was at the core of that lineage's spread. The two main Palestinian signatures lie **at the edge** of the same network, with few links.
- The main Muslim Kurd signature is only **one mutation step** from the CMH, but on the neighboring Eu 9 branch.
- CMH-bearing chromosomes were found in every population studied **except the Bedouin**.

VI. WHERE PALESTINIAN AND JEWISH LINES PART

The report locates the difference between Palestinians and Jews in one specific set of lineages:

- Eu 10 is the most common branch among Palestinian Arabs (38.4%) and Bedouin (62.5%), against 12.8–22.2% in the Jewish groups.

- A cluster of **Arab-specific Eu 10 types** makes up about **29% of Palestinian** and **37.5% of Bedouin** Y chromosomes — and was **not found in any non-Arab group** in the study.
- Outside Eu 10, Palestinians shared 20–46% of their chromosomes with the four non-Arab populations.

The authors' working model: Palestinian and Bedouin Y chromosomes represent *"to a large extent, early lineages derived from the Neolithic inhabitants of the area"* — the part shared with Jews — plus later lineages brought mainly by migrations from the Arabian Peninsula. They point to tribal movements from Arabia into the southern Levant in the Byzantine period, reaching their height with the Muslim conquest of 633–640, and to the same Arab-specific types appearing in Yemen (56% in Sana'a, 16% in Hadramaut).

VII. THE JEWISH COMMUNITIES AMONG THEMSELVES

The authors begin from the statement that:

"it is believed that the majority of contemporary Jews descended from the ancient Israelites that had lived in the historic land of Israel until ~2000 years ago."

Their data on the three communities:

Overall

A **high degree of genetic affinity** among all three. None clustered with the peoples they lived among in exile — Eastern Europeans, Iberians, or North Africans — with large distances (F_{ST} above 0.12) from each host population. The authors conclude this *"argues against substantial admixture of males."*

Sephardic and Kurdish Jews

Statistically **indistinguishable** from one another, even though Iraqi and North African communities were likely apart for about 1,000 years. The authors say these communities *"seem to have preserved, to a large extent, their original Y chromosome pools."* The Iraqi community traces to the Assyrian and Babylonian exiles (723 and 586 B.C.E.).

Kurdish Jews and the Ten Tribes tradition

The report records the old tradition that the Jews of Kurdistan descend from the **Ten Tribes** carried off in the Assyrian exile of 723 B.C.E. The study does not test that tradition directly. What it does find is that Kurdish Jews are **no closer to their Muslim Kurdish neighbors** than Sephardic or Ashkenazi

Jews are — so male intermixing in Kurdistan was below detectable levels. The first-century conversion of the Kingdom of Adiabene did not leave a noticeable mark on their paternal pool.

Ashkenazi Jews

Slightly but significantly different from the other two. The report links this to a branch called **Eu 19**, found in 12.7% of Ashkenazim and very common (54–60%) in Eastern Europeans. The authors give two possible explanations: low-level gene flow from European populations, or — offered explicitly as a hypothesis — descent of some Ashkenazim from the **Khazars**, a Turkic people who converted to Judaism in the ninth century. The study does not decide between them.

Later evidence: The Khazar idea was later tested on a much larger data set and was not supported (Behar et al. 2013; see Section IX, study 8).

VIII. HOW OLD THE SHARED LINES ARE

The two branches that dominate the whole sample, **Eu 9** and **Eu 10**, show opposite north–south gradients: Eu 9 is more common in the north (the Kurds’ central type sits at its core) and Eu 10 in the south (the CMH sits at its core). The authors suggest Eu 9 arose in the northern Fertile Crescent and Eu 10 in the southern part, while cautioning that data for some populations were missing.

TABLE 5 — ESTIMATED START OF EXPANSION

BRANCH	25-YEAR GENERATIONS	35-YEAR GENERATIONS
Eu 9	about 7,000 years ago	about 9,850 years ago
Eu 10 (carries CMH)	about 6,400 years ago	about 9,000 years ago
Hg 9 (Eu 9 + Eu 10)	about 7,500 years ago	about 10,500 years ago

These estimates carry wide confidence ranges (e.g., Eu 10 at 25-year generations: 11,800–3,700 years ago).

These dates fall in the Neolithic and early Chalcolithic periods — far earlier than any of the present peoples. The authors conclude that *“the common genetic Middle Eastern background predates the ethnogenesis in the region,”* and that the shared paternal pool also predates the language divisions: Kurdish and Armenian (Indo-European) speakers are genetically close to Semitic-speaking Jews and Arabs.

IX. WHAT OTHER DNA STUDIES ADD

The 2001 report is one witness. The studies below, published before and after it, test the same question with other samples and newer methods, including whole-genome data and DNA from ancient skeletons. Each one is marked by what it does to the 2001 findings: **Strengthens** or **Adds a qualification**. Both kinds are included so the picture stays honest.

A. THE PATERNAL LINE (Y CHROMOSOME)

1. Jews and their Middle Eastern neighbors share one paternal pool

Hammer et al., Proceedings of the National Academy of Sciences, 2000 **STRENGTHENS**

This study of 1,371 men from 29 populations found that Jewish men from Europe, North Africa, and the Middle East share paternal signatures with Palestinians, Syrians, and Lebanese, and differ from non-Jewish men outside the region. It estimated European admixture in the Ashkenazi paternal line at only about **12.5% in total** (roughly 0.5% per generation over 80 generations). One of the researchers, Harry Ostrer, said that Jews and Arabs *"are all really children of Abraham."*

2. The companion study on Palestinian Arabs

Nebel et al., Human Genetics, 2000 **STRENGTHENS**

This is the earlier study that the 2001 report builds on. Among 143 Palestinian and Israeli Muslim Arabs, it found *"a common pool for a large portion of Y chromosomes"* with Jews, *"suggesting a relatively recent common ancestry."* The two most common Arab paternal types were **closely related to the Cohen Modal Haplotype**. It also found a separate Arab cluster (32% of Arab chromosomes) that is rare in Jews, which matches the 2001 report's account of the Arabian layer.

3. The priestly line goes back about 3,200 years

Hammer et al., Human Genetics, 2009 **STRENGTHENS**

Using many more markers, this study refined the Cohen signature into an **extended Cohen Modal Haplotype** that accounts for **almost 30% of Cohanim** in both Ashkenazi and non-Ashkenazi communities and is *"virtually absent in non-Jews."* It dated the common male ancestor to about **3,200 years ago in the Near East**. It also found that the priesthood includes several unrelated male lines, not just one.

4. The Ashkenazi Levites came from the Near East

Rootsi et al., Nature Communications, 2013 **STRENGTHENS**

Earlier work had noted that over half of Ashkenazi Levites carry a paternal branch (R1a) that is common in Eastern Europe, which suggested a European origin. By sequencing whole Y

chromosomes, this study found that the Levite branch (M582) is **absent in 922 Eastern Europeans** but present in Near Eastern men, where it is more diverse. The authors conclude that the Levite founder came from the Near East and was *"likely present among pre-Diaspora Hebrews."*

5. The Samaritans are paternally close to the Cohanim

Oefner et al., Human Biology, 2013 **STRENGTHENS**

The Samaritans are a small community who trace themselves to the northern Israelite tribes that remained in the land after the Assyrian exile of 722–720 B.C.E. This study found that they are **closely related to the Cohanim** on the paternal line, and several Samaritan family lines fall in the Cohen Modal Haplotype cluster. This is independent evidence of an Israelite paternal line surviving outside the Jewish communities.

B. THE WHOLE GENOME

6. Most Jewish communities trace to the Levant

Behar et al., Nature, 2010 **STRENGTHENS**

Genome-wide data from 14 Jewish diaspora communities and 69 non-Jewish populations showed that *"most Jewish samples form a remarkably tight subcluster"* that does not cluster with their diaspora host populations. The authors conclude the data *"trace the origins of most Jewish Diaspora communities to the Levant."* The exceptions were Ethiopian and Indian Jews, who cluster with their neighbors; even so, the Bene Israel of India show a clear paternal link to the Levant.

7. Abraham's children in the genome era

Atzmon et al., American Journal of Human Genetics, 2010 **STRENGTHENS**

This study of seven Jewish populations found distinct Jewish clusters, *"each with shared Middle Eastern ancestry,"* with varying amounts of European and North African admixture. The non-Jewish peoples closest to the Jewish groups included the **Palestinians, Bedouin, and Druze.**

8. No evidence of Khazar origin

Behar et al., Human Biology, 2013 **STRENGTHENS**

This study tested the Khazar hypothesis mentioned in Section VII with the largest data set assembled up to that point: 1,774 samples from 106 populations, including the Caucasus and the lands of the former Khazar kingdom. Ashkenazi Jews showed **no particular similarity to Caucasus populations.** Their ancestry traced mainly to the Middle East and Europe, with the most shared ancestry with other Jewish groups.

9. Religion, not ancestry, has divided the Levant only recently

Haber et al., PLOS Genetics, 2013 **STRENGTHENS**

This study of 1,341 people from the Levant found that *"recent genetic stratifications in the Levant are driven by the religious affiliations of the populations,"* and it places that structuring within roughly the last 2,000 years. Sephardic Jews cluster tightly with other Levantine groups. This supports the 2001 finding that the shared foundation is older than the present peoples.

C. ANCIENT DNA FROM THE LAND

10. Jews and Arabs both descend largely from the people of the Bronze Age land

Agranat-Tamir et al., Cell, 2020 **STRENGTHENS**

Researchers from Tel Aviv University, the Hebrew University, and Harvard recovered genomes from **73 people buried at five Bronze Age and Iron Age sites** in the southern Levant, all sharing Canaanite material culture. Present-day Jewish groups and Levantine Arabic-speaking groups were both found to carry **50% or more** of their ancestry from people related to these Bronze Age inhabitants. This is the first direct ancient-DNA link, and it supports the 2001 report's central claim of a common ancient source.

11. First DNA from an Iron Age Judahite tomb (preliminary)

Abu Ghosh, near Kiryat Yearim, reported 2023–2024; full paper not yet published **ADDS A QUALIFICATION**

A burial cave dated about **750–650 B.C.E.**, late in the First Temple period and about 15 km west of Jerusalem, yielded DNA from two people. The man carried paternal haplogroup **J2**. These are early, partial results from two individuals, and the researchers say a full paper is still to come. They should not be relied on until it is published.

D. FINDINGS THAT QUALIFY THE PICTURE

12. The Ashkenazi maternal line is largely European

Costa et al., Nature Communications, 2013 **ADDS A QUALIFICATION**

The 2001 report looked only at fathers. This study of mitochondrial DNA (passed from mothers) found that all four major Ashkenazi maternal founders, about 40% of Ashkenazi mtDNA, have **prehistoric European ancestry**, as do most of the minor founders. The authors conclude that the women who founded Ashkenazi communities were largely *"assimilated within Europe,"* pointing to conversion of women. So the Middle Eastern paternal line is strong, but the maternal line tells a different story.

13. Medieval Ashkenazi skeletons show mixed ancestry

Waldman et al., Cell, 2022 **ADDS A QUALIFICATION**

Genomes from 33 Jews buried in 14th-century Erfurt, Germany, were already genetically similar to modern Ashkenazim. Modelling their ancestry gave a mix of Middle Eastern and Mediterranean European sources; one model gave **19–43% Middle Eastern** and **37–65% Mediterranean European**. The Ashkenazi founding event took place about 1,000 years ago. This fits the 2001 finding of a small European input in the Ashkenazim, but shows it is larger across the whole genome than on the father's line.

TABLE 6 — LATER STUDIES AT A GLANCE

STUDY	EFFECT	KEY POINT
Hammer 2000 (PNAS)	Strengthens	Jews share a paternal pool with Palestinians, Syrians, Lebanese
Nebel 2000 (Hum Genet)	Strengthens	Arab and Jewish Y chromosomes share a large common pool
Hammer 2009 (Hum Genet)	Strengthens	Priestly signature about 30% of Cohanim, ancestor about 3,200 years ago
Rootsi 2013 (Nat Commun)	Strengthens	Ashkenazi Levite line is Near Eastern, not European
Oefner 2013 (Hum Biol)	Strengthens	Samaritans paternally close to Cohanim
Behar 2010 (Nature)	Strengthens	Most Jewish communities trace to the Levant
Atzmon 2010 (AJHG)	Strengthens	Shared Middle Eastern ancestry; closest to Palestinians, Bedouin, Druze
Behar 2013 (Hum Biol)	Strengthens	No Khazar contribution found
Haber 2013 (PLOS Genet)	Strengthens	Religious divisions are recent; shared base is older
Agranat-Tamir 2020 (Cell)	Strengthens	Jews and Arabs both 50% or more Bronze Age Levant ancestry
Abu Ghosh 2023–24	Qualification	First Iron Age Judahite DNA; preliminary
Costa 2013 (Nat Commun)	Qualification	Ashkenazi maternal line largely European
Waldman 2022 (Cell)	Qualification	Medieval Ashkenazim of mixed Middle Eastern and European descent

Shaded rows add qualifications rather than direct support.

X. LIMITS OF THIS REPORT

- **Fathers' line only.** The Y chromosome traces a single paternal line. As Costa et al. (2013) show, the maternal line can tell a different story.
- **Israelite DNA is only beginning to be tested.** The 2001 study compares living peoples. Bronze Age genomes (2020) now link both Jews and Arabs to the ancient people of the land, but the Iron Age Judahite results are preliminary and come from only two people. Israelite descent is best supported by the priestly and Levite lines and by the Levantine clustering of Jewish communities, not by any single test.
- **Older methods, modest samples.** The 2001 report used 13 binary and 6 repeat markers with 32–143 men per group. The genome-wide studies in Section IX confirm its main conclusions.
- **Hypotheses are marked.** The northern and southern origins of Eu 9 and Eu 10 and the Arabian source of the Arab-specific lineages remain the authors' models. The Khazar idea raised in the 2001 report was later tested and not supported (Behar 2013).
- **Genetics is not covenant.** A shared chromosome pool describes ancestry; it does not define who belongs to a people or to a covenant.

XI. SUMMARY OF FINDINGS

TABLE 7 — THE HEBREW RELATION AT A GLANCE

RELATION	FINDING
Among Jewish communities	High affinity; Sephardic and Kurdish indistinguishable in this test; Ashkenazi slightly different; none absorbed into host nations
Jews – Palestinian Arabs	Large shared paternal pool from a common ancient source; close but significantly different
Jews – Bedouin	Most distant pairing in the study
Jews – Kurds, Turks, Armenians	Closest of all — no significant difference at the group level
Jews – Europeans	Distant on the father's line; Ashkenazim carry more European ancestry through the maternal line and whole genome (2013, 2022)
Palestinian distinctness	Arab-specific lineages (about 29%) likely from Arabian migrations in the last 2,000 years
Priestly line (CMH)	Most common type in all Jewish groups; at the center of the Eu 10 family; dated about 3,200 years (2009)

RELATION	FINDING
Jews and Arabs – ancient land	Both carry 50% or more ancestry from Bronze Age Levantine people (ancient DNA, 2020)

SOURCES

- Nebel et al. 2001, American Journal of Human Genetics 69:1095–1112 (the source report) — [https://www.cell.com/fulltext/S0002-9297\(07\)61325-1](https://www.cell.com/fulltext/S0002-9297(07)61325-1)
- Hammer et al. 2000, PNAS — <https://www.pnas.org/doi/10.1073/pnas.100115997>
- ScienceDaily report on Hammer 2000 — <https://www.sciencedaily.com/releases/2000/05/000509003653.htm>
- Nebel et al. 2000, Human Genetics — <https://link.springer.com/article/10.1007/s004390000426>
- Hammer et al. 2009, Human Genetics — <https://pmc.ncbi.nlm.nih.gov/articles/PMC2771134/>
- Rootsi et al. 2013, Nature Communications — <https://www.nature.com/articles/ncomms3928>
- Oefner et al. 2013, Human Biology — <https://rosenberglab.stanford.edu/papers/OefnerEtAl2013-HumBiol.pdf>
- Behar et al. 2010, Nature — <https://www.nature.com/articles/nature09103>
- Atzmon et al. 2010, American Journal of Human Genetics — <https://www.sciencedirect.com/science/article/pii/S0002929710002466>
- Behar et al. 2013, Human Biology — <https://digitalcommons.wayne.edu/humbiol/vol85/iss6/9/>
- Haber et al. 2013, PLOS Genetics — <https://journals.plos.org/plosgenetics/article?id=10.1371/journal.pgen.1003316>
- Agranat-Tamir et al. 2020, Cell — [https://www.cell.com/cell/fulltext/S0092-8674\(20\)30487-6](https://www.cell.com/cell/fulltext/S0092-8674(20)30487-6)
- Tel Aviv University news on Agranat-Tamir 2020 — <https://english.tau.ac.il/news/canaanites>
- Abu Ghosh Iron Age DNA report (Madan, 2024) — <https://madan.org.il/en/news/archaeologists-extract-dna-ancient-israelites>
- Costa et al. 2013, Nature Communications — <https://www.nature.com/articles/ncomms3543>
- Waldman et al. 2022, Cell — <https://www.sciencedirect.com/science/article/pii/S0092867422013782>

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RESEARCH SUMMARY — THE HEBREW RELATION IN THE Y CHROMOSOME

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THE MESSAGE IS SENT TO THE WORLD