



BMJ. 2006 Jan 21; 332(7534): 140.

PMCID: PMC1336798

## Gene tests show that two fifths of Ashkenazi Jews are descended from four women

[Judy Siegel-Itzkovich](#)

[Copyright](#) © 2006, BMJ Publishing Group Ltd.

---

Four “founding mothers” who lived in Europe a thousand years ago were the ancestors of two fifths of all Ashkenazi (European origin) Jews. This is the conclusion of a team of researchers at the Technion&Israel Institute of Technology, Haifa, after they compared DNA sequences from nearly 2000 Jews with those of 11 500 non-Jewish people in 67 different populations around the world.

The remaining 60% were found to have much more heterogeneous genetic origins.

The team, led by doctoral student, Doron Behar, and his supervisor, Professor Karl Skorecki of the Technion’s medical faculty and Rambam Medical Centre in Haifa, published their findings online ahead of print publication in the American Journal of Human Genetics on 11 January ([www.journals.uchicago.edu/AJHG/home.html](http://www.journals.uchicago.edu/AJHG/home.html)). The article will appear in print in the March edition.

Professor Skorecki, a nephrologist who also conducts genetic research, is known for his 1997 discovery of DNA marker evidence showing that most modern day Jewish men of the paternally inherited priestly caste (the Kohanim) are descendants of a single common male ancestor.

The latest discovery, which will be followed by genetic studies of the Druze minority in Israel and other communities, has important implications beyond its inherent historical interest, said Professor Skorecki, as it adds to understanding of the mechanisms of genetic health and disease in different populations around the world.

Because of its relative isolation over many centuries the Ashkenazi population, which accounts for most of the world’s Jews today, is also known to have accumulated some 20 recessive hereditary disorders (such as Tay-Sachs disease) that are rarely found in other populations.

The team, which studied mitochondrial DNA (mtDNA) passed on solely by mothers to their children, found evidence of shared maternal ancestry of Ashkenazi and non-Ashkenazi Jews, a finding showing a shared ancestral pool that is consistent with previous studies that were based on the Y chromosome. This evidence pointed to a similar pattern of shared paternal ancestry of Jewish

populations around the world originating in the Middle East. They concluded that the four founding types of mtDNA—likely to be of Middle Eastern origin—underwent a major overall expansion in Europe over the last thousand years.

The “four founding mothers,” he added, “are from lineages that originate long before the launching of the Jewish people some 3400 years ago. They probably came from a large Middle Eastern gene pool.

“As consistent with the Bible, in which the founding Jews were Abraham, Isaac, and Jacob and his sons, and the matriarchs were ‘imported’ from non-Jewish peoples and then converted, the haplotypes of contemporary Jewish men are much less varied.”

Geneticists such as David Goldstein, formerly of University College London and now of Duke University in the United States, have argued that the Ashkenazi communities of central and northern Europe were established by Jewish men who migrated from the Middle East, perhaps as traders, and married women from local populations who converted to Judaism.

In a comment to the press after reading the new Israeli study, Professor Goldstein said he had not changed his views, as “the mtDNA of a small, isolated population tends to change rapidly as some lineages fall extinct and others become more common, a process known as genetic drift.”

In his view, the Technion team confirmed that genetic drift had played a major role in shaping Ashkenazi mtDNA, but he maintained that the linkage with Middle Eastern populations was not statistically significant.

“Because of genetic drift, Ashkenazi mtDNAs have developed their own pattern, which makes it very hard to tell their source. This differs from the patrilineal case,” Professor Goldstein said, “where there is no question [that they are] of a Middle Eastern origin.”

The four haplotypes found in 40% of Ashkenazi samples were absent from gentile Europeans but were present in Sephardi (Oriental) Jews, although much less frequently, Professor Skorecki said. He added that it was important to conduct genetic research on Jewish populations now, because the opportunity would soon disappear, with the intermarriage in Israel between Jews of Ashkenazi and Sephardi origin as well as assimilation and intermarriage of diaspora Jews with the Gentile majority outside Israel.