

שאלות ותשובות במראה הבזק – BaMar'eh HaBazak

Eretz Hemda Institute – מכון ארץ חמדה

Rabbis Yosef Carmel and Moshe Erenreich, Founders and Heads of Yeshiva

30 – Establishing Halachik Jewishness through mitochondrial genetic identification

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### **30. Establishing Halachik Jewishness based upon genetic testing.**

Translated by Heschel Weiner, 2018. Notes to this responsa are paraphrased translations of the notes in the original Hebrew responsa. Some of the notes in the original responsa are omitted. The responsa translation is modified for clarity.

#### **Inquiry of Jewish Law:**

A woman claims that she is Jewish. Her grandmother, a holocaust survivor, refuses to help her substantiate her claim by hiding all evidence that could support the claim that they (she and her grand-daughter) are Jewish. The claimant grand-daughter desires to join a Jewish congregation (Kehilah) and to observe the Torah according to her understanding. The woman is married to a gentile who is not interested in conversion. The woman claimant will not be able to perform a conversion procedure.

The woman performed a genetic test of her mitochondrial DNA and traced herself, her mother and maternal grandmother to a Jewish family. The woman also uncovered information that will lead her in contacting members of the family. Indeed, there is no one to testify concerning her Jewishness as all family members who could effectively establish her connection perished in the holocaust or have since died.

Are the genetic tests sufficient to establish the woman as Jewish to facilitate her joining the community without conversion?

#### **Jewish Law response:**

We will primarily discuss the standing of mitochondrial DNA testing under halacha and secondarily touch upon the standing of general DNA testing under halacha.

1. 'Rov'<sup>1</sup> is an acceptable halachik mechanism under which Jewish identity can be established. Some argue that the (Talmudic) sages restricted the use of Rov only to cases of "Leta Kaman"<sup>2</sup> or

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<sup>1</sup> Rov – רוב, translated as "majority" refers to a halachik legal mechanism that identifies (equates) the individual status of a component with the status of the majority of components within a set.

<sup>2</sup> In short, a Rov that is Leta Kaman – ליתא קמן – is based upon a large sample of global findings (the majority of kosher animals are presumed not to contain internal injuries that would render them a forbidden 'trefa'. A rov that is Ita Kaman – איתא קמן – is based upon the a common property found in the components that are within observation (the majority a butchers in this town sell kosher meat).

to cases of “Ita Kaman” where two Rovs are present.<sup>3</sup> Others hold that, for purposes of Jewish identification, one Rov is sufficient in a case of Ita Kaman.<sup>4</sup> All agree that an “extraordinary ID mark” – סימן מובהק – Siman Muvhak – can be relied upon to establish Jewish identity.<sup>5</sup>

2. DNA test results today<sup>6</sup> can be established with such a high level of accuracy confidence<sup>7</sup>, that it can (for some applications of law) be considered a Siman Muvhak. In those situations, DNA testing is clearly an acceptable means of establishing Jewish heredity. Therefore, if the DNA test, performed in a certified facility, reliably identifies a child to a specific Jewish mother, the subject is undoubtedly Jewish in all respects.
3. The entire mitochondrial DNA (mtDNA) sequence passes hereditarily to the child from the mother, exclusively. The child's father has no influence upon the mtDNA sequences received by the child from its mother.<sup>8</sup> Additionally, there exists specific mtDNA sequences, detailed in a scientific report reproduced as an addendum to this responsa (titled “The Matrilinial Ancestry of Ashkenazi Jewry; Portrait of a Recent Founder, Behar, et. al 2005) that are found at high percentage levels of frequency only and exclusively within specific Jewish populations; i.e. of Ashkenazic – European extraction.
4. However, based upon our investigation, the results of mtDNA testing are not sufficient to be considered a Siman Muvhak<sup>9</sup>

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<sup>3</sup> If the Rov is Leta Kaman, all poskim (decisors of Jewish Law) hold that Jewish identity is established. In a case of Ita Kaman, some poskim declare one Rov to be sufficient to establish Jewish identity. Others require two Rovs.

<sup>4</sup> Rabbi M.M. Farbshtein (Techumim 12, pp. 28-31) considers Russians emigrating to Israel as belonging to a ‘Rov’ of Jews that is Leta Kaman.

<sup>5</sup> Rashi, Gittin 27b “and only- ואין אחר” ‘There is no clearer testimony that this’.

<sup>6</sup> In courts of law and Batei Dinim

<sup>7</sup> Indeed, there are differences of accuracy confidence levels between results based upon a variety of factors encountered in research projects. In some instances, it is possible to obtain a 99.99% confidence level.

<sup>8</sup> Mitochondrial DNA resides within the mitochondria located in the cell cytoplasm, as opposed to nuclear or genomic DNA that resides in the cell nucleus in the form of chromosomes. After conception, mtDNA (Mitochondrial DNA) is destroyed within the father's sperm cell. The child receives nuclear DNA from both parents but mtDNA from the mother only.

<sup>9</sup> Regarding agunah, Rabbi Zalman N. Goldberg accepts DNA identification to permit the agunah to remarry. He considers DNA ID as a Siman Muvhak with regards to agunah. The following 3 objections were made to R. Goldberg.

- a. Because every human genome has not been sequenced and compared, the assumption that each person has a unique DNA sequence structure (fingerprint) is not valid. Rabbi Goldberg's response to this objection: Experimentation done to date adequately establishes that each person has a unique DNA signature. In halacha we have determined that each person has a unique face even though the Talmudic sages did not see all human faces. They saw enough to form a basis of Rov. Eretz Hemdah adds that modern science experts have determined that undoubtedly each person has a unique DNA signature. To reject this finding is irrational and borders on “Hillul Hashem (desecration of God's name)” if the intent is to merely create a wedge between Torah and Science.
- b. Even if adequate research was performed to substantiate a reliable assumption that most people have a unique DNA signature, that would be tantamount to creating a new Rov that is ‘Leta Kaman’.

5. Results of mtDNA testing described in #3 above can only be accepted as identifying the subject as part of the Rov (Ashkenazi Jew of European extraction) where there exists additional corroborating evidence of Jewishness (even if the corroborating evidence of itself is not sufficient).<sup>10</sup>

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The Talmud never mentioned DNA as acceptable Rov Leta Kaman. Accordingly, DNA must be unacceptable as a Rov Leta Kaman because the Talmudic sages must have had 'other considerations' that are unknown. Otherwise, DNA would have been stated in the Talmud as acceptable. Rabbi Goldberg's response to this objection: Every Rov Leta Kaman was formulated by the Talmudic sages upon observations of the existing facts. There is no reason to suppose that they had 'other considerations' that guided their definition of a Rov Leta Kaman.

- c. DNA identification is performed by matching sequences at 14 loci within the genome. Each locus match is not a Siman Muvhak by itself. Only the combination of matches at all 14 loci combine to make one Siman Muvhak. According to Rema (Even Ha'Ezer 17:24) this is not a Siman Muvhak. Rabbi Goldberg's response to this objection: Because a complete genomic sequence of DNA is considered one system, the combination of 14 loci matches within the system is considered one Siman Muvhak. There are a number of precedents in halacha that support this contention.
- d. In Nishmat Avraham, 2<sup>nd</sup> printing, Even Ha'Ezer, 4:13, page 69, Rabbi S.Z. Auerbach is quoted as having said, "If this test is conventional and globally accepted via many repetitions resulting in clear and truthful results; then logically, halacha can be based upon it as well."
- e. Rabbi Shmuel Vosner (Techumim Vol. 21, pp. 121-123) disagrees with Rabbi Goldberg regarding agunah. According to R. Vosner, DNA matching is not the sole basis upon which an agunah may be permitted to marry. However, R. Vosner distinguishes within DNA matching as follows:
  - a. Identifying a limb to its lost host (via existing DNA on record) is close to being a Siman Muvhak. R. Vosner does not declare it to be halachik Siman Muvhak.
  - b. Identifying a body to family members is a Siman Benoni – and average identification.

<sup>10</sup> The reason for this rationale is based upon "Bayes' Law" (or Bayes' Theorem or Bayes' Rule).

- a. For a discussion of Bayes' Law see: [https://en.wikipedia.org/wiki/Bayes%27\\_theorem](https://en.wikipedia.org/wiki/Bayes%27_theorem).
- b. The world Jewish population makes up less than .2 of 1% of the entire world population.
- c. The specific mtDNA sequences that have statistically significant frequencies in the Ashkenazic Jews of European extraction are also present in the general population at much lower frequencies that are not statistically significant.
- d. Even with their statistically insignificant frequencies, the absolute number of people in the general world population possessing the mtDNA sequences in common with the Ashkenazic Jews of European extraction, is greater than the entire population of Ashkenazic Jews of European extraction.
- e. Without corroborating considerations that would place the subject within the "Ashkenazic Jews of European extraction" subset, the subject must be seen in relation to set of global population. From this point of reference, the Rov is not Jewish.
- f. However, if the subject is seen (via corroborating considerations) as a member of the "Ashkenazic Jews of European extraction" subset, the mtDNA results would positively identify the subject as Jewish.
- g. Before the Holocaust, there was a 2% chance that any person coming from the Soviet Union was Jewish. That statistic added to the Bayes formula calculates out to a higher than 50% chance that the subject is Jewish.

6. During the great Holocaust, innumerable congregations of Israel were ruined and annihilated. Concurrently with the Holocaust and afterwards, an iron veil was constructed between the Jewish inhabitants of the Soviet Union and their Father in Heaven; and between them and their Torah observant brethren worldwide. This situation made it impossible for many European Jews to establish their Jewish identities in normal ways via legal documents or family testimonies. Accordingly, our generation is charged with the responsibility to help them clarify their Jewish status according to Jewish law (Halacha). MtDNA testing can help solve this problem because it can assist many from among those who emigrated from the Soviet Union to establish their Jewish identity.
7. Accordingly, we call upon the Chief Rabbinate of the State of Israel to work with the government of the State of Israel and make it possible for new emigres from the former Soviet Union who have yet to establish their Jewish identity and desire as such, to do so. This, if they desire to arrange a blood test of mtDNA in a reliable and certified laboratory for purposes of clarifying their Jewish identity, of their own volition and freedom of choice. Additionally, to establish a staff of judges (Halacha Dayanim) dedicated solely to this important task, of investigating whether or not the subject can be declared halachically Jewish based upon Rov.
8. Because most Jews do not carry the described mtDNA sequences, anyone choosing to perform the mtDNA test that does not ultimately support an Ashkenazic Jewish European extraction, will not be injured in any way.

Approbation of Rabbi Z.N. Goldberg

“In my humble opinion, the above appears to be true and reliable for practical application”

Zalman Nechemiah Goldberg

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- h. If the subject's grandmother is her maternal grandmother, then there is at least a 2% chance that her grandmother is Jewish. And we know that her mtDNA is the same as the subject's. Factoring this statistic into Bayes' Law calculates a more than 50% chance that the subject's maternal grandmother is Jewish.
  - i. The maternal grandmother, and hence the subject, would be declared halachically Jewish on the basis of Rov Leta Kaman.