

Y-DNA and Documentary Research Collaboration Reveals Ancestral Origins

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Most Y-DNA projects are surname-based; their goal is to discover whether a group of men with the same or similar surnames descends from a common male ancestor. Since Y-DNA is passed only by males to their male progeny, it is the ideal chromosome to compare among men who share a surname.

The typical Y-DNA project starts with a thesis (e.g., all Bacharachs are related to each other), and then data is collected that eventually proves or disproves the thesis.

The WIRTH Project originated instead from the data; a group of men independently tested their Y-DNA and found that they matched one another and that they descended from a single common male ancestor. These men then formed a group and sought to determine who that common ancestor might have been. Although they had different surnames, members of the group shared certain rare mutations in the sections of the Y-chromosome used for genealogical matching that made it nearly certain they had a common ancestor in recent history, but likely prior to the adoption of Jewish surnames in most of Eastern Europe. A lineage rather than a surname group, WIRTH was an acronym composed of the first initials of the last names of its first five members: Wolinsky, Issroff, Rossoff, Tenenbaum, and Huebscher.

The late Herbert Huebscher's articles in AVOTAYNU in Winter 2003 and Summer 2007 describe the early days of this project. This article discusses new findings since the last article and details the partnership among the WIRTH, Frankfurt and Bacharach projects.

At the time of Huebscher, Issroff, Friedman, and Hübscher's presentation to the IAJGS conference in 2008, the WIRTH group largely consisted of men whose Y-pedigrees were documented only a few generations back in Eastern Europe.¹ Huebscher et al. understood that the best hope for extending the project's collective Y-pedigree would be a close Y-DNA match with someone having a paper trail to a well-documented surname. One of the final slides entitled "Where Do We Go From Here?" contained this bullet

point: "One Option: Perhaps A Family Will Come Along with a Perfect Paper Trail Back to the Middle Ages, and Much of Our Puzzle Will Be Solved..."² This was the "Holy Grail" of the project. Even though it likely never would be possible to fill in all the missing generations, still the group would discover who their most remote common paternal ancestor might have been by linking their DNA to someone else's documentation.

Long Y-Pedigree Matches

Between 2009 and 2013, the matches Huebscher and the rest of the group had been waiting for came into the FTDNA database. Not one, but four men with reasonably long Y-pedigrees, all going back to famous rabbis, matched the WIRTH group.

The first set of significant matches appeared in 2009, when the Bacharach project recruited several men for Y-DNA testing. Huebscher contacted Rachel Unkefer, the Bacharach group administrator, when he discovered the matches. The Bacharachs appeared to be a subset of the WIRTH group, forming a distinct branch. They matched each other closely, but most of the rest of the group more distantly. The Bacharach group had some participants with documented Y-pedigrees going back to the 17th century, but the surname is documented in Frankfurt as early as 1392 when a Gottschalk Bacharach lived in the house of the Rosenbusch.³ The genetic split between the Bacharach group and the rest of the WIRTH group appeared to have occurred sometime in the Middle Ages, so it was unclear if the WIRTH group's common ancestor carried the Bacharach surname or whether the connection was further back in time.⁴

In 2011, Janet Akaha started the Frankfurt DNA project to establish the Y-DNA "signatures" for all the early Frankfurt Jewish families. Frankfurt is an ideal focus for a Y-DNA project because the majority of its Jewish population adopted relatively fixed surnames when they were invited back to Frankfurt in 1360, usually derived from the towns from which they had come (Bacharach, Oppenheimer) or the picture signs upon their houses that served as identifiers

the way we now use numbers (Rothschild=red shield, Rindskopf=oxen head),⁵ The Frankfurt families stayed in the same houses for several generations, which provided a continuity of surnames as is evidenced by the records in *Ele Toldot*, the death records of the community.⁶ Frankfurt also was a location where most leading, prominent Asheknazi rabbinic families lived at one time or another and a hub of commercial travel with existing Jewish records going back to at least 1241 CE.

As part of her Frankfurt project, Akaha recruited a descendant of the famous Rabbi Jakob ben Yehuda Weil (Mahari'V), also known as the Rabbi Weil der Stadt. This descendant turned out to match the WIRTH markers. To confirm this finding, two further Weils were tested whose documentation also showed them to be probable descendants of the Rabbi Weil der Stadt. They also matched the WIRTH group. A fourth match, also recruited by the Frankfurt project, represented a Weil branch whose surname became Rindskopf in the 17th century.

When these new matches were incorporated into the WIRTH project, the cluster of participants whose Y-DNA most closely matched the Weil Y-DNA were more closely related to each other, according to the Y-DNA, than they were to the Bacharach group. Since Rabbi Weil der Stadt was born at the end of the 14th century, and the Bacharach surname existed around that same time, it appeared that at least two different rabbinic families had branched off from an earlier common ancestor.

Another Frankfurt find turned out to be a WIRTH, a descendant of Rabbi Samson Wertheimer (1658-1724) who was the financier for King Leopold of Austria and Chief Rabbi of Hungary. That descendant's Y-DNA put him in the Bacharach branch. Research is ongoing to determine the family connections between the Wertheimer and Bacharach families in the 16th century. (See the Bacharach article in AVOTAYNU Winter 2013 for more details.)

Potentially the most exciting of the Frankfurt DNA project recruits who turned out to be a WIRTH was a possible descendant of Moshe Treves, Baal Hatosafot (b.~1060). Later generations of the Treves family served as rabbis in Paris until Jews were expelled from France in 1394. This individual's Y-pedigree went back far enough to link to the *Ele Toldot* records and Naftali Treves who died in Frankfurt in 1534. This provided the oldest Y-pedigree to date for the group. A tree in the *Jewish Encyclopedia* shows Naftali Treves' Y-pedigree back to Jochanan Treves in the 13th century. The documentation for the intervening years, based on rabbinical sources, is missing some generations back to Moshe Treves.

The rest of the members of the WIRTH group, most of whom had short Y-pedigrees, learned they shared an ancestor with the Weil, Bacharach, and (tentatively) Wertheimer and Treves rabbinic families. By virtue of the matching Y-DNA, they were able to bridge to much older families, albeit missing documentation for many generations.

Y-DNA for just one documented Treves descendant is not enough to prove descent for the WIRTH group from Moshe Treves, and one documented Wertheimer is not enough to prove that Rabbi Samson Wertheimer was a Bacharach descendant. Additional tests are underway, the results of which should be available by late Spring 2014. We also are actively seeking additional descendants from documented branches of the families above to confirm our findings. "Y-Charts" on the Jews of Frankfurt website show these Wertheimer and Treves lines (jewsoffrankfurt.com).

Y-DNA

As of March 2014, the WIRTH group has 182 members, 112 of whom have been tested at 111 markers on the Y chromosome. At the time of Huebscher's 2007 AVOTAYNU article, the WIRTH group had 58 members and the highest resolution test available was 67 markers. For the purposes of comparing Y-DNA in this article, we have only included the results for those 112 people who have tested 111 markers.

The Y-DNA of members of the WIRTH group has at least four distinguishing characteristics:

- Location DYS464 has six copies (a-f) of the repeating pattern (STR) rather than the usual four (a-d).
- Location DYS464b has a micro-allele (a partial repeat), which is expressed as 13.1, meaning that there are 13 repeats plus another partial repeat.
- Location CDY has three copies of the repeating pattern rather than the usual two.
- Members test positive for two single nucleotide polymorphisms (SNPs): L556 and L560 (29 WIRTH members have been tested for these SNPs and all have been positive.)

Four men who are outside the WIRTH group but share a common ancestor much farther back in time (sharing the M92 SNP with the WIRTH group) also have been tested for these SNPs and were found to be negative, confirming that the SNPs called L556 and L560 are unique to the WIRTH group.

WIRTH group members belong to the haplogroup formerly known as J2a4b1. The official haplogroup tree is currently being re-organized and branches being renamed, so one current way of referring to the haplogroup is by the SNPs that define it: J-L556 or J-L560. The rarity of these characteristics makes it a near certainty that all members of the group share a common male ancestor. The challenge is to figure out when he lived, and, if possible, who he was.

Time to Most Recent Common Ancestor

Determining when a Most Recent Common Ancestor (MRCA) lived is not an exact science. Available tools use various mathematical methods to compare STR markers and calculate the genetic distances between the men in the group, two at a time.⁹ A matrix is generated showing how many markers are different (the genetic distance) between each person in the group and each other person.

Calculations then are performed to estimate the TMRCA

(Time to Most Recent Common Ancestor) between each pair of participants, based on statistically derived mutation rates. These calculations generate another matrix that shows each participant and his TMRCA with each other participant. Because mutations are random and can happen in any generation, the best one can calculate is a range of probabilities, rather than an exact date.

In Huebscher's 2007 article, 27 members tested at 37 markers, and there was a 95 percent probability that the MRCA lived some time between 1300 and 1700 CE. In March 2014, with the enlargement of the group and the refinement of testing more markers, the MRCA is farther back in time. Comparison of the 112 members who have tested 111 markers, shows that the farthest distance to the MRCA between any pair of participants at 95 percent probability is 44 generations, or about 850 CE. In other words, if we look at each participant compared to each other participant, we can say the probability is 95 percent that the MRCA for the two least closely related people lived no more than 44 generations ago.¹⁰ This is the most conservative estimate used. The MRCA is likely to have lived more recently.

When we do the calculations for a smaller group, only those with known ancestors born prior to 1700, the probability is 95 percent that the MRCA lived no earlier than 36 generations ago and there is a 50 percent probability that the MRCA lived no more than 25 generations ago (See Figure 1)

Analysis of Phylogenetic Trees

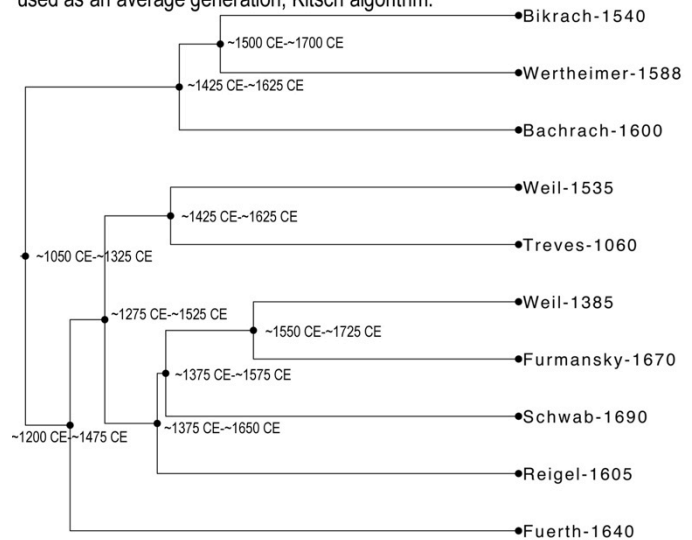
A phylogenetic tree is not the same as a family tree. Instead it is a graphical representation of the similarities and differences among individuals' Y-DNA, showing likely paths of divergence over time. This divergence is caused when one son is born with a genetic mutation not shared with his brothers. The mutation is passed down from that generation forward only in that branch of the family, while the brothers' descendants continue without that mutation, but possibly with other, different mutations. Over the course of several generations, more mutations are randomly introduced, causing different branches of the same family to have different mutation patterns. Overall, those who are the most closely related (share the most recent common ancestor) should have the most similar DNA.

A phylogenetic tree for the entire group is too large to reproduce here, and different methods of producing charts can result in diagrams that appear contradictory. A tree for the 10 members with the oldest Y-pedigrees is included here and gives a general idea of the main branches and when they diverged.

Based on the assumed family tree for our one Treves descendant, we believe there are approximately 31 generations between the living descendant and his most distant known ancestor, Moshe Treves, Baal Hatosafot (b. ~1060). This is approximate because there could be errors or omissions in published or private genealogies.¹¹

Figure 1. Phylogenetic tree of all members of the WIRTH Group with known ancestors born prior to 1700.

Named nodes on the right are living participants and the birth year of their oldest known Y-DNA ancestor. Nodes to the left are marked with a date range within which the birth year of the common ancestor of that branch is estimated to have occurred (the 1st number with a probability of 95% of being no further back, and the 2nd a probability of 50% of being no further back). 25 years used as an average generation, Kitsch algorithm.



For this article, we generated TMRCA matrixes and phylogenetic trees (graphic representations of groupings based on the genetic distance between participants) for the entire group of 112 participants in two ways: using the most conservative 95 percent probability parameter and using a much less conservative 50 percent parameter (meaning a 50 percent probability that the TMRCA is no greater than the estimated number). According to the 95 percent probability calculation:

- The greatest number of generations from an MRCA in the group is 44, that is, the most distantly related pair has a common ancestor no more than 44 generations ago.

- 77 out of 112 (66 percent) fit within 31 generations of a TMRCA with the Treves descendant; that is, the majority of the group, when compared with the Treves descendant, has a 95 percent probability of a common ancestor no more than 31 generations ago.

- The MRCA for the entire group would have lived no earlier than about 650 CE.

There are several outliers within the WIRTH group whose TMRCA with the Treves descendant is greater than 31 generations with a 95 percent probability. Possible explanations include:

- They are descended from an ancestor who lived farther back in time than Moshe Treves.

- Anomalous mutations in their lines cause inaccuracies in the relationship estimates.

- Their line produced more generations since the 11th century than our living Treves descendant's line.

- Using 95 percent probability calculations is too

conservative. See "Interpreting Y-DNA Markers: A Primer" in this issue for a complete explanation.

Using the 50 percent probability calculation yields:

- The greatest number of generations between all pairs in the group is 31; that is, the most distantly related pair has a common ancestor who lived no more than 31 generations ago.
- A 100 percent fit within 31 generations of a TMRCA with the documented Treves descendant; in other words, the entire group could share Moshe Treves as a common ancestor.
- The MRCA would have lived no earlier than about 1175 CE.

For a subgroup composed of just the 10 participants with documented ancestors born before 1700, the TMRCA was even closer. See the phylogenetic tree of this group. (Figure 1)

- The greatest number of generations between all pairs in the group at 95 percent probability is 36.
- The greatest number of generations between all pairs in the group at 50 percent probability is 25.
- 8 out of 10 in this subgroup have a 95 percent probability of a common ancestor within 31 generations with the documented Treves descendant, 100 percent have a 50 percent probability of a common ancestor within 31 generations of the Treves descendant.

The Bacharach group's TMRCA with most of the rest of the group is significantly greater, indicating the possibility of a genetic branching off close to the time of Moshe Treves, Baal Hatosafot.

The Weil family is likely to have branched off later. Weil descendants in the project share a common ancestor with the Treves descendant in the range of 15 (95 percent)-23 (50 percent) generations ago, which would be 8-16 generations after Moshe Baal Hatosafot, or approximately 1300 to ca. 1500 CE. The earliest known use of the Weil surname by Rabbi Jakob ben Yehuda Weil fits within this range.¹²

Several different trials of phylogenetic tree diagrams using different algorithms and formats produce similar results, showing one common ancestor for the entire group and from that common ancestor two branches, which we call the Bacharach and Weil branches. Within the Weil branch are many sub-branches including the Treves descendant, the Weils and the majority of the Eastern European families with various non-Weil surnames. On the Bacharach side is one branch whose common ancestor might have lived just before the adoption of the Bacharach surname, which then splits further into two: the group with predominantly Bacharach surnames and their close genetic matches and another branch with no Bacharach surnames.

Depending upon which probabilities are used, these branches all appear to connect back to an ancestor in the range of 31-44 generations ago. Because our oldest presumed Y-pedigree goes back to Moshe Treves, Baal Hatosafot, our hypothesis is that he or one of his siblings, ancestors, or descendants is the MRCA of the entire group.

Geography

The Frankfurt project started creating Y-pedigrees with the *Ele Toldot* burial data, but these early documented families were not confined to Frankfurt.¹³ Business, family relationships, distant rabbinic and *batei din* (rabbinic law courts) posts, study with famous rabbis, laws limiting the number of Jewish households within certain regions and government expulsions caused branches of these families to be dispersed across Europe.

Four of the Frankfurt families who are part of the WIRTH project (Bacharach, Treves, Weil, and Wertheimer) traveled extensively and held rabbinic posts in all the major capitals of Jewish learning of the 13th to 19th centuries: Fulda, Krakow, Mainz, Paris, Prague, Vienna and Worms, to name a few. Some branches of these families also expanded outside the cities to the surrounding areas of Belarus, Bohemia, Lithuania and Moravia. It is not surprising that this family left descendants throughout Eastern Europe.

The Treves family is known to have lived in Barcelona in the 13th and 14th centuries and also France, Germany, Italy and Sicily. An oral history exists of the Weils having originated in Spain, possibly around the same time as Matathias Treves who later returned to France in 1361, but this is disputed.¹⁴

Levite or Not?

A few WIRTH group members identify themselves as Levites, but most do not. As new members came into the group because of their DNA matches, Huebscher queried them about their family traditions, resulting in about a 20 percent response of Levite membership. Because Levite status is passed from father to son (patrilineally), everyone with the same Y-DNA should have the same status. In his 2007 article, Huebscher made the assumption that group members were Levites, partially because of family tradition of some of the participants, but also the discovery of a *ketubah* (marriage contract) for one of them noting his Levite status.

This now seems less likely, given the genetic ties to at least three well-known rabbinic lines: Bacharach, Weil and Wertheimer, who were not known to be Levites. A number of centuries-old gravestones exist in the Frankfurt and Worms cemeteries for members of these families, and none shows any symbols or inscriptions indicating Levite status.

One possible explanation for this discrepancy is that one or more non-paternal events or undocumented adoptions several centuries ago resulted in offspring who assumed the Levite status from men they mistakenly assumed to be their fathers. Over the course of a dozen or more generations, a sizable number of descendants would have this family Levite tradition—with Y-DNA from non-Levite ancestors. If this were the case, we might expect to see clusters of similar Y-DNA markers among these men, but so far we cannot identify any such group. This is an area of ongoing investigation.

Sephardic or Not?

A few of the families represented in the WIRTH group had oral histories of having been Sephardic. When a man named Rosa from Puerto Rico emerged as a Y-DNA match to the WIRTH group, there was speculation that the common ancestor would turn out to be a converso from Spain since, at that time, the MCRA was believed to have lived about 500 years ago—the time when Jews were expelled from Spain. This would give the entire group a Sephardic origin, even though all but this one man traced their European origins to Lithuania, Poland, Ukraine, and other East-em European locales.

The hope was that an ancestor for Rosa could be found and documented in Spain in the 15th century, which would give the entire group its missing Y-pedigree. Unfortunately, Rosa was able to trace his own ancestry only to 1869. An effort to locate records for his family in archives in Spain was unsuccessful. Still, Huebscher asserted that the WIRTH group was likely to have been Sephardic, because no Jews were present in Puerto Rico before the end of the 19th century. "At this point, we lean towards the hypothesis of Sephardic origins for the entire WIRTH group," Huebscher said in the 2007 AVO-TAYNU article.

The new data that comes with the more recent Y-DNA matches points to potential common ancestors in France and Germany, well before the 1492 expulsion from Spain. This makes a Sephardic ancestor for the entire group less likely. While members of the Weil and Treves families went back and forth between France, Italy, and Spain at various times, we have no evidence that they were there at the time of the Spanish Inquisition or considered themselves Sephardic. At least one of the descendants of Rabbi Treves took the surname Ashkenazi, which would be an unlikely action for someone with Sephardic origins.

So, how did the WIRTH Y-DNA make its way to Puerto Rico? In 1815, the port cities (including Aguadas where the Rosa family lived) were opened to foreign traders, particularly those from countries that were friendly with Spain. Those countries included England, Germany, the Netherlands, and their Caribbean colonies (particularly Curacao and St. Thomas). Several of the Caribbean Islands had long-standing Jewish communities, from the 17th century onward. Any one of the descendants of a WIRTH common ancestor in Europe could have made his way to the Netherlands and from there to Curaçao or St. Thomas and on to Puerto Rico.

Even though the 1815 law required non-Catholic settlers to convert to Catholicism, in 1830, Guillermo (William) and Carlos (Karl) Oppenheimer, sugar traders with the firm of Moller and Oppenheimer, arrived in the coastal city of Ponce from New York. They were originally from Hamburg. We have not been able to find anything about their ancestry, but it is possible they were Jewish. Someone named Luis Moises (Moses), which possibly is a Jewish name, lived in Arecibo. The sugar trade offered many opportunities for non-Spanish

Europeans to spend time in Puerto Rico in the 19th century. This is another possible explanation for how a person with the WIRTH Y-DNA ended up in Puerto Rico.

To test whether Rosa was likely to have recent Jewish ancestry, the WIRTH project conducted a Family Finder (autosomal DNA) test at Family Tree DNA (FTDNA). He did not match with anyone of readily identifiable Ashkenazi Jewish descent. The Family Finder test is generally assumed to be relatively accurate in identifying some Jewish ancestry within the past five generations, which would make a Jewish ancestor much after about 1800 unlikely. This could be within the historical window of Germans in Puerto Rico, but just barely.

Some of the scenarios depicted by phylogenetic trees indicate a possible branching of the Rosa family and three other families early enough to have a separate geographic history from the rest of the group. This opens up the possibility that at least one Treves branch stayed in Spain or returned to Spain and went to the West Indies as conversos. If that is the case, and if we define Sephardic only as having lived in Spain at the time of the Inquisition, it is just this small branch that could have been Sephardic, and not likely the entire WIRTH group.

Conclusion

The WIRTH project continues to contact men who are Y-DNA matches with the group and asks them to join the project. As more data is collected, we will continue to narrow down the possibilities for the MRCA. The Frankfurt project continues to research and recruit additional offspring of the Bacharach, Treves, Weil and Wertheimer rabbinical lines and expects to uncover additional "Holy Grail" lineages.

By happenstance, and because of Herb Huebscher's close monitoring of the FTDNA database for matches to his group, the WIRTH project was able to join forces with the Bacharach Y-DNA Project and the Frankfurt Jewish Y-DNA Project. This collaboration has given the participants of the WIRTH project with short Y-pedigrees the knowledge that they likely descend from an ancestor who spawned at least four notable European rabbinic lines.¹⁶

Notes

1. For the purposes of this article, the term Y-pedigree will be used to denote a male's ancestral lineage only on his father's father's (etc.) side. This is the line through which the Y chromosome is inherited. No female ancestors are part of this Y-pedigree, as females do not have a Y chromosome.

2. Huebscher, Herbert, Saul Issroff, MD, Elise Friedman and Roberto Hübscher, "A Y-DNA Study of 60 Related Families Within a Unique Jewish Cluster: How DNA Found the Genealogical Connection between Seemingly Disparate Families," presentation at the annual conference of the International Association of Jewish Genealogical Societies, 2008.

3. Rabbi Dr. A. Lewin, "Die Gottschalke von Bacharach und Kreuznach," *Gemeindeblatt der Israelitischen Ge-meinde*

Frankfurt, July 1933.

4. Calculations using the genetic distance between several pairs of participants on different branches of the tree yield a range of 850 CE to 1625 CE. Because there are more than 100 people to compare, and some have mutations that appear to be outliers, a firmer date is difficult to determine.

5. Freimann, A. and F. Kracauer, *Frankfort* (Jewish Communities Series), translated by Bertha Szold Levin, Jewish Publication Society of America, 1929.

6. *Ele Toldot* (Burial records of the Jewish community of Frankfurt am Main), 1241-1824, www.lbi.org/digi-baeck/results/?qtype=pid&term=258967.

7. "Treves" in the unedited full-text of the 1906 *Jewish Encyclopedia*, www.jewishencyclopedia.com/articles/14503-treves.

8. The International Society of Genetic Genealogy (ISOGG) maintains the Y-DNA Haplogroup Tree, which is the generally recognized taxonomy of Y-DNA, www.isogg.org/tree/index.html.

9. Sites such as the McGee Y-Utility (www.mymcgee.com/tools/yutility.html?mode=ftdna_mode) provide free tools to generate data files for input into various free diagramming programs such as Fluxus (www.fluxus-engineering.com/sharenet.htm), FigTree (<http://tree.bio.ed.ac.uk/software/figtree/>), and Phylip (<http://evolution.genetics.washington.edu/phylip.html>).

10. See "Interpreting Y-DNA Markers: A Primer" in this issue for a more detailed explanation of the TMRCA calculations and the estimates of probability.

11. Most published family trees available for the oldest rabbinical families are constructed from a combination of rabbinic commentaries and similar documents, personal documents, oral histories, historical documents and contemporaneous records. In many cases, genealogists and scholars dispute details of the genealogies. It is not possible to be 100 percent certain of the accuracy of any family tree spanning more than 30 generations.

12. Frank, Werner L., "Early History of the Rabbinical Weil Family (Clarifying Some Historical Errors)", *The RAVSIG Online Journal*, www.jewishgen.org/rabbinic/journal/weil.htm

13. *Ele Toldot* (Burial records of the Jewish community of Frankfurt am Main), 1241-1824. www.lbi.org/digi-baeck/results/?qtype=pid&term=258967.

14. Frank, Werner L., "Legacy: The Saga of a Jewish German Family Across Time and Circumstance," AVOTAYNU, 2003.

15. Francisco A. Scarano, ed., *Inmigracion y Closes Sociales en el Puerto Rico del Sigh XIX* (Immigration and Social Classes in 18th Century Puerto Rico), San Juan, Puerto Rico: Ediciones Huracan, 1981.

16. "Y-Charts" (partial family trees) for the rabbinic families may be found at the Jews of Frankfurt website: jewsoffrankfurt.com and more information on the Bacharach project is at bacharachdna.com. The DNA results of the WIRTH project may be viewed at the Family Tree DNA site: www.familytreedna.com/public/WIRTH.

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