

The DNA Case for Bethuel Riggs

The following was originally intended as an appendix to Alvy Ray Smith, *Edwardian Riggses of America I: Elder Bethuel Riggs (1757–1835) of Morris County, New Jersey, and His Family Through Five Generations* (Boston: Newbury Street Press, 2006). It was removed for space considerations. It is the 67-marker version of a paper published earlier by the author, which was based on 25 markers.^[1]

The proposition is presented and proved that Bethuel Riggs was an “Edwardian” Riggs—that is, that he carried the same Y chromosome, to within a few mutations, as Edward Riggs, immigrant to Roxbury, Mass., in 1633.^[2] This is equivalent to stating that Bethuel and Edward share descent from a common Riggs ancestor, including the possibility that Bethuel descended from Edward himself.

Using mathematical terminology from my background, this is an existence proof that there exists a path of descent to Bethuel from the common Riggs ancestor. It is not a constructive proof, since no actual descent path is established, a problem remaining to be solved. Despite many claims to the contrary, I am convinced that no such descent path for Bethuel has yet been properly established. Volume 3 of this work is devoted to exploring possible descent paths from Edward of Roxbury and criticizing those that have been offered.

The DNA matching tests used here for proof depend on the fact that a male passes his Y chromosome, unchanged, to his male offspring. This is true to within the possibility that over, say, three or four centuries, a few mutations have crept into the Y-DNA (DNA in the Y chromosome). So a Riggs male who is a true descendant from Edward Riggs of Roxbury will carry Edward’s Y chromosome. Here and henceforth I omit the qualifier “to within a few mutations,” being understood always to be the case. Two living Riggs males who are both descendants of Edward of Roxbury will have the same Y chromosome. This fact is what is tested. DNA samples are taken from the putative descendants, by swabbing in-

1. Alvy Ray Smith, “The Y-DNA Signature of Edward Riggs of Roxbury,” *NEA* 6(2005):46–48.
2. The Edwardian terminology was suggested by Robert Charles Anderson, FASG.

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side their cheeks. If they indeed share a common ancestor, then the Y-DNA in the two samples will match. The same qualifier applies here: The Y-DNA matches if it is the same to within a few mutations.

The final step in the proof requires that the Y-DNA of Edward Riggs of Roxbury be known. This is where classic genealogy plays a crucial part. If a Riggs male matches a known descendant of Edward Riggs, then either the Riggs male is also a descendant of Edward or both he and Edward of Roxbury are descendants of a common ancestor, say a father, or great-grandfather, of Edward.

Fortunately, the Y-DNA of Edward of Roxbury is now known. Among the contributors to the author's Riggs Y-DNA Study Group are several who are bona fide descendants from Edward of Roxbury. These descents have been established from the written record using classic genealogical methods. From these individuals the Y-DNA "signature" of Edward of Roxbury has been established. See fig. 1 and Table 1.

The major results of the Study Group to date are these:

1. The Y-DNA signature of Edward Riggs of Roxbury is established on 67 markers. This signature identifies Edwardian Riggses.
2. Bethuel Riggs was an Edwardian Riggs. This does not establish that he descended from Edward, but he either descended from Edward, or he and Edward descended from a common ancestor.
3. Known brothers, Silas Riggs and James Riggs, thought to have been sons of Isaac Riggs, were also Edwardian Riggses—as, of course, would have been Isaac. This does not establish that they were Bethuel's brothers, as some believe, but only that they shared a common Edwardian ancestor.
4. Nathaniel³ Riggs, previously believed to have been adopted, was a biological son of Nathaniel² Riggs, youngest son of Bethuel¹.

Details

The entire Y chromosome is not checked for a match. Only selected sites, called "markers," are examined, and these are in locations on the Y chromosome currently thought to contain "junk" DNA. That is, they do not carry information that might be construed as confidential, such as

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information about diseases. The number of markers used in the matching tests for the Riggs Y-DNA Study Group is 25.^[3] 12 markers are too few for definitive answers, as has been proved in the Study Group itself, in results not shown here.

A “signature” consists then of 25 numbers, one for each marker. Formally this is called a “haplotype.” The number is the repeat count of a certain sequence of DNA nucleotides (the famous A, G, C, and Ts) particular to each marker. The actual sequence at each marker need not concern us here. Table 1 summarizes the results on 25 markers for nine individual Riggs surname males used to establish the conclusions above (see Technical Details for identities of the markers).

The genealogically established descendants of Edward Riggs of Roxbury are persons 1-3 and 5—that is, the Riggs males with the signatures shown in those respective rows. The signature, or haplotype, in row 4 (or 5-7) is taken to be the “standard Edwardian Riggs signature.” One could argue that among the four established descendants of Edward of Roxbury, marker 5 at 13 is more likely to be the actual signature of Edward. The choice for “standard” was made considering the strong possibility (discussed further below) that persons 4, 6, and 7 are descendants of Edward³, along the New Jersey branch of the family of Edward of Roxbury, and that therefore it would be more likely that the 14 mutated to a 13, instead of vice versa. In other words, the most parsimonious conclusion is that the actual signature of Edward Riggs of Roxbury is the standard Edwardian Riggs signature as exemplified by persons 4 through 7.

It is safe to say that the actual signature of Edward of Roxbury on these 25 markers is either the standard, or “modal,” Edwardian Riggs signature or within one or two distance-1 mutations from it. This limited amount of mutation distance is considered a match on these 25 markers. Notice that the Edward Riggs descendant in row 1 is distance 2 from the

3. The number of markers used for the original report was 25, but has been increased to 67 with no substantive change in the results formerly reported. The argument presented here uses only 25 markers for simpler presentation. For reference, the full 67-marker signature of an Edwardian Riggs is (in the standard order used by testing company FamilyTreeDNA): 12 24 14 11 14 16 12 12 12 13 13 29, 19 9 10 11 11 25 15 19 29 15 15 17 17, 11 10 19 23 15 15 17 18 37 38 12 12, 11 9 15 16 8 10 10 8 11 10 12 21 23 16 10 12 12 15 8 12 23 20 13 12 11 13 11 11 12 12.

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standard signature. The signature differs from the standard only by distance 1 on marker 5 and distance 1 on marker 24 (shown in gray). All the other individuals have signatures that differ from the standard by distance 1 or are exact matches to it.

The markers in red are those that change fastest and are therefore likely to mutate most often, according to the testing company, FamilyTreeDNA, used by the Riggs Y-DNA Study Group (see Technical Details for more company information). Notice that all mutations, relative to the standard Edwardian Riggs signature, occur in the red markers.

Persons 8 and 9 are genealogically established descendants of Bethuel Riggs. Each is distance 1 from the standard Edwardian Riggs signature, hence a match to it. These two individuals are widely spread genealogically, being third cousins, thrice removed. It is good practice in Y-DNA matching to prove families by taking at least two widely spread individuals from the family. This guards against non-paternal events—for example, adoption or adultery—which must change the Y-DNA of the “descending” party.

But Y-DNA matching can also disprove what are thought to be non-paternal events. For example, person 8 is a genealogically known descendant from Nathaniel³ Riggs, long thought to be the adopted son of Nathaniel² Riggs, son of Bethuel¹. The match between persons 8 and 9, and they with the standard Edwardian signature, prove that they have a common Edwardian Riggs ancestor. The simplest reason for this is that Nathaniel³ Riggs was the biological son of Nathaniel² Riggs. See fig. 2.

Person 4 is a genealogically established descendant from Silas Riggs, and persons 6 and 7 are similarly known to descend from James Riggs. Silas and James were known brothers, thought to have been sons of Isaac Riggs. So good practice is served because persons 4 and 6 are widely separated genealogically. They are fourth cousins, once removed. Good practice is observed in the subfamily of James Riggs, with persons 6 and 7 matching but at a wide genealogical separation. They are third cousins, once removed. See fig. 2.

As with Bethuel, the descents of Silas and James from Edward of Roxbury are often claimed, but I do not consider the descents established. However, the Y-DNA studies summarized here prove that they were at

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least Edwardian. The results say nothing about whether Bethuel was their brother, but do not rule out that possibility since all three were Edwardian.

What keeps me from claiming descent from Edward of Roxbury himself? It is tempting to do so because the families of Bethuel, Silas, and James, all have traditions taking them back to Morris Co., N.J. It is known that descendants, Edward² and Edward³, of Edward¹ of Roxbury founded Newark, N.J., then their descendants moved into Morris Co. in the slow push of the family to the west. The circumstantial case is strong. However, it is conceivable that some other Edwardian branch immigrated to America and a descendant found his way into a locale thought to be populated only by direct descendants of Edward of Roxbury.

The circumstantial argument would be stronger if another known early Riggs in Massachusetts were shown to be non-Edwardian. He is Thomas Riggs, known to have been in Gloucester, Mass., in 1658. However, at this writing, Thomas Riggs has been demonstrated to have been Edwardian, so he and Edward Riggs shared a recent ancestor in England.^[4]

The Riggs Y-DNA Study Group has so far discovered two non-Edwardian Riggs Y-DNA lines in America in the sense that two Riggs males with non-Edwardian signatures have been tested, and both of them are distant from one another.^[5] However, good practice has not yet been followed here because the individuals are only single representatives of their respective lines. It is possible that non-paternal events have made the results irrelevant. So these are presented in Table 2 principally to show what a non-match looks like. Person 4 is included from Table 1 as a representative of the standard Edwardian Riggs signature. Person 10 is distance 14 from the standard Edwardian Riggs signature on 25 markers, and person 11 is distance 11. Person 10 is distance 11 from person 11.

Mutations themselves can be interesting. Notice in Table 1 that persons 1-3 all share the same mutation in marker 5. Then notice in figure

4. This result was obtained since my paper on Edwardian Y-DNA was published.

5. The number of non-Edwardian Riggs family has recently been increased to three.

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1 that these are exactly the three males in the Edward³ branch of the family of Edward¹ of Roxbury. So the mutation in marker 5 serves to distinguish the signatures of this subfamily. However, at this time we do not know at what generation the mutation entered the signature along this line. Incidentally, Edward³ was a son of Edward² who left Derby, Conn., to live in New Jersey, while the Samuel³ branch remained in Connecticut. This geographical distinction held over many generations, so is part of the argument supporting the claim that the signature of person 4, say, is that of Edward of Roxbury. Since it is unlikely that there was any cross-fertilization from the New Jersey branch, then the earliest common ancestor of the four gentlemen at the bottom of fig. 1 has to have been Edward². But Edward² was the only son of Edward¹ to survive to manhood. The actual argument is stronger than this. We know that there was no cross-fertilization between the Connecticut and New Jersey lines because we know the actual descents.

Bethuel Riggs and Isaac Riggs are believed to descend from the New Jersey branch of the Edward Riggs of Roxbury family, either from Edward³ or his brother Joseph³, both in the New Jersey branch. These descents are unknown at present (Oct. 2006). We have contributed the strong fact that Edwardian descents must exist, but unfortunately do not yet know them. Nor do we know if the Edwardian Y chromosome comes via Edward of Roxbury himself.

Technical Details

The company used for testing by the Riggs Y-DNA Study Group is Family Tree DNA - Genealogy by Genetics, Ltd., of Houston (FamilyTreeDNA, for short). All transactions are between that company and the subjects themselves, with the Study Group serving only as facilitator. The Study Group shares, of course, in the test results.

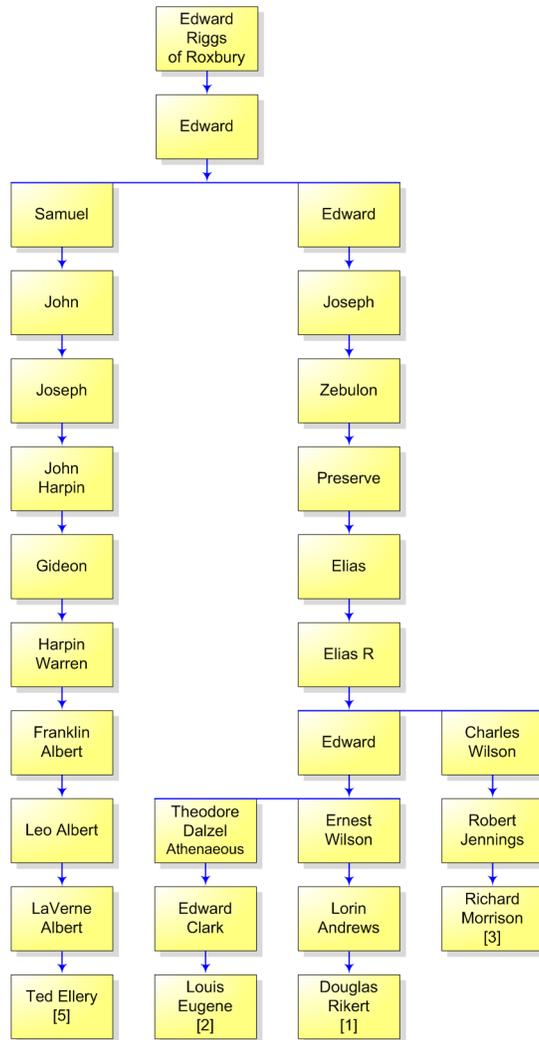
The 25 markers are arranged in the order used by FamilyTreeDNA in its presentation of results. Each marker has a Designated Y-chromosome Segment (DYS) number. They are given in tabular form in Table 3.

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Special Acknowledgment

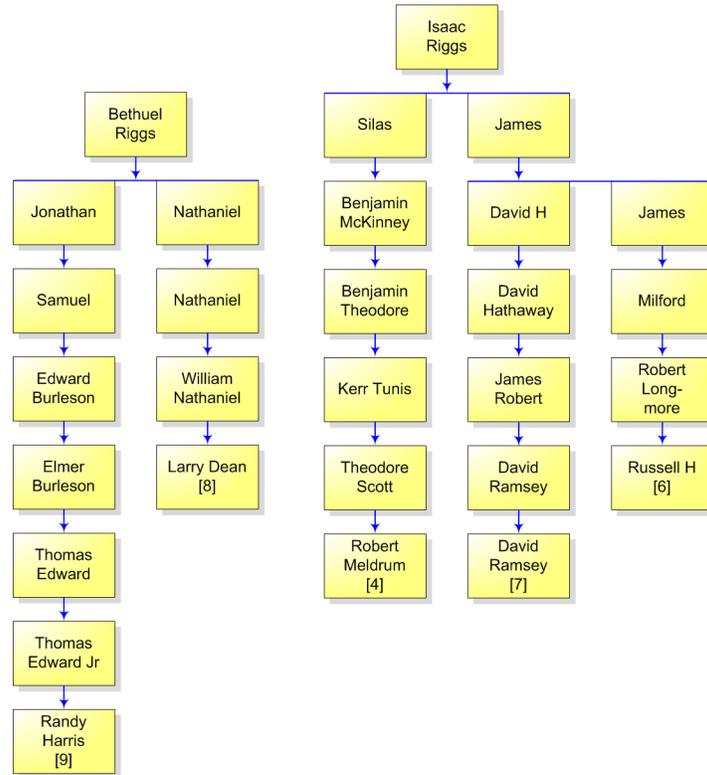
The author thanks Robert Charles Anderson, FASG, and Marsha Hoffman Rising, CG, FASG, for careful readings and thoughtful discussions of the content of this appendix and the paper derived from it.

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1. Established Riggs descendants of Edward of Roxbury. The four males at the bottom have matching Y-DNA. Bracketed numbers correspond to Table 1 Y-DNA signatures.

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2. Established Riggs descendants of Bethuel and Isaac. The five males at the bottom have matching Y-DNA. Bracketed numbers correspond to Table 1 Y-DNA signatures.

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Table 1. Matching Y-DNA signatures of nine males with the Riggs surname, where gray cells denote mutations from the standard Edwardian Riggs signature

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25
1	12	24	14	11	13	16	12	12	12	13	13	29	19	9	10	11	11	25	15	19	29	15	15	16	17
2	12	24	14	11	13	16	12	12	12	13	13	29	19	9	10	11	11	25	15	19	29	15	15	17	17
3	12	24	14	11	13	16	12	12	12	13	13	29	19	9	10	11	11	25	15	19	29	15	15	17	17
4	12	24	14	11	14	16	12	12	12	13	13	29	19	9	10	11	11	25	15	19	29	15	15	17	17
5	12	24	14	11	14	16	12	12	12	13	13	29	19	9	10	11	11	25	15	19	29	15	15	17	17
6	12	24	14	11	14	16	12	12	12	13	13	29	19	9	10	11	11	25	15	19	29	15	15	17	17
7	12	24	14	11	14	16	12	12	12	13	13	29	19	9	10	11	11	25	15	19	29	15	15	17	17
8	12	24	14	11	14	16	12	12	12	13	13	29	19	9	10	11	11	25	15	19	29	15	15	17	18
9	12	24	14	11	14	16	12	12	12	13	13	29	20	9	10	11	11	25	15	19	29	15	15	17	17

Table 2. Non-matching Y-DNA signatures of three males with the Riggs surname

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25
4	12	24	14	11	14	16	12	12	12	13	13	29	19	9	10	11	11	25	15	19	29	15	15	17	17
10	13	23	14	10	11	14	12	12	12	13	13	29	17	9	9	11	11	24	15	20	29	15	15	17	18
11	13	24	14	10	11	15	12	12	12	13	13	29	18	9	10	11	12	25	15	19	31	15	15	16	17

Table 3. Designated Y-chromosome Segment (DYS) numbers for the 25 markers used in Table 1 and Table 2—e.g., marker 9 is DYS439, and marker 10 is DYS389I1. The red markers mutate at a higher rate than the black ones.

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25
	3	3	1	3	3	3	4	3	4	3	3	3	4	4	4	4	4	4	4	4	4	4	4	4	4
	9	9	9	9	8	8	2	8	3	8	9	8	5	5	5	5	5	4	3	4	4	6	6	6	6
	3	0		1	5	5	6	8	9	9	2	9	8	9	9	5	4	7	7	8	9	4	4	4	4
					a	b					11	12		a	b							a	b	c	d