

# **Predicting Origins of the Dunbar Lineage 2 Branch Using Y-DNA and Ancestry Data**

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## **INTRODUCTION**

The Dunbar surname has a 1000-year history originating with Gospatric, 1<sup>st</sup> Earl of Dunbar (b.1040,db.1131), and his descendants in southeast Scotland in the 13<sup>th</sup> century when surnames were first adopted in Scotland [Ref. 2 and 3]. Over the centuries, many different Dunbar branches evolved in Scotland with some migrating to Ireland, England, America, Australia, Canada, and other parts of the world beginning in the 17<sup>th</sup> century. In recent years, Y-DNA test results for males have been used to identify various Dunbar branches, define their ancestry and origins, and track their migrations. Many males including the author have completed Family Tree Y-DNA tests and participated in the Dunbar Surname DNA Project (“Project”) sponsored by the Clan Dunbar organization [Ref. 6]. The Y-DNA test results showed all of the Project participants carry the M269 haplotype associated with the older R-M269 haplogroup which originated in central Europe around 20,000 to 30,000 years ago and then migrated to Western Europe. But in more recent historical times, the Dunbar branches split-up with different haplotypes and associated haplogroups which were identified in the Project as “Dunbar Lineages”. The largest number of participants in the Project carry the U106 haplotype with ancestry descending from the male-lines of Gospatric, and they are classified in the Dunbar Lineage 1 (“L1”) branch. The next largest number of participants in the Project including the author carry the M222 haplotype, and they are classified in the Dunbar Lineage 2 (“L2”) branch. There are also several additional lineages defined for smaller groups of Project participants carrying different haplotypes with less well-defined ancient ancestry. The primary purpose of this paper is to predict the origins of the Project participants who are classified in the Dunbar L2 branch who carry the M222 haplotype based on their Y-DNA test results and their known ancestry information.

Many studies of Y-DNA test results have shown that the M222 haplotype associated with the R-M222 haplogroup originated in northwest Ireland about 2500 years ago and it represents over 12% of the current male population in Ireland. Some members of this R-M222 haplogroup probably migrated to southwest Scotland about 1000 years ago with the Viking and Irish invasion of Galloway where there is a relatively high concentration of the M222 haplotype in the Y-DNA database [Ref. 8]. Some members of this R-M222 haplogroup probably originated the L2 branch when they acquired the Dunbar surname as a result of associations with L1 branch members such as the Dunbar of Cumnock and Mochrum branch who owned lands and lived in southwest Scotland beginning in the 13<sup>th</sup> century [Ref. 2 and 3]. Some Scottish members of the L2 branch migrated from southwest Scotland to the Ulster Plantation in Ireland in the 17<sup>th</sup> and 18<sup>th</sup> centuries and became part of the people who were later called “Ulster Scots” in Great Britain. Some of these Ulster Scot members of the Dunbar L2 branch migrated from Scotland and Ireland to other parts of the British Empire including Australia, Canada, and other parts of the world by the mid-1800’s. Some of the Ulster Scots in the Dunbar L2 branch migrated from Ireland to America in the mid-1700’s to mid-1800’s where they were known as “Scots-Irish” in America. The author’s earliest known Scots-Irish Dunbar L2 branch ancestor in America was “John Dunbar of Philadelphia County (b.1733,d.1778)” who was born in County Tyrone, Ireland [Ref. 4]. Some of the Dunbar L2 branch descendants of the Ulster Scots still live in Northern Ireland as

shown in the ancestry information for some of the Project participants. This paper attempts to predict the ancestral origins and connections in past times of the Dunbar L2 branches for Project participants whose earliest known ancestors can be traced to the Ulster Scots in Ireland.

## **USING Y-DNA DATA TO PREDICT ANCESTRY ORIGINS OF DUNBAR LINEAGE 2**

A Y-DNA test is a genealogical DNA test of a male's Y-chromosome which is used to explore a man's patrilineal or direct father's-line ancestry. The Y-chromosome passes down virtually unchanged from father to son. Every now and then there are occasional mistakes in the copying process, and these mutations, or changes in the Y-chromosome, can be used to estimate the time frame in which the two individuals shared a "Most Recent Common Ancestor", or "MRCA". If their Y-DNA test results are a perfect or nearly perfect match, they are related within a genealogical time frame. Each matching person can then review the other's father-line information which typically includes the names of each patrilineal ancestor and his spouse along with the dates and places of their marriage and of both spouses' births and deaths. The two matched persons may find a MRCA as well as whatever information the other already has about their joint patrilineal or father's line prior to the MRCA. Y-DNA tests are typically coordinated in a surname DNA project such as the Dunbar Surname DNA Project.

The terminology associated with Y-DNA testing that is used in this paper is summarized as follows based on the more detailed descriptions listed on the Family Tree DNA, or "FTDNA" website [Ref. 8]:

- A "marker" refers to a physical location on the male Y-chromosome, and the term is often used colloquially in genetic genealogy to refer to a STR. The Y-12, Y-25, Y-37, Y-67, and Y-111 STR tests refer to Y-DNA tests for a panel of 12, 25, 37, 67, and 111 markers, respectively,
- A "STR" is a "Short Tandem Repeat" which is a short DNA pattern repeated in tandem, e.g., the sequence "ATGC" repeated 11 times would give the marker a value, or "allele", of 11. STRs mutate faster including within one lifetime and STR tests can be used as a guide to predict common ancestors, but they cannot predict specific sub-haplogroups younger than the much older R-M222 and R-M269 haplogroups assigned to Dunbar Lineage 2 ("L2") branch members, referred to herein as "testees", based on their STR test results.
- The "GD" is the "Genetic Distance" which is the number of differences, or mutations, between two sets of STR test results when comparing Y-chromosome DNA. A GD of zero means there are no differences in the STRs or markers being compared against one another, i.e., an exact match. Although two men may have the same number of differences in markers, or GD, they may not have the same predicted past time of the MRCA because the mutation rates of different markers vary.
- A "SNP" is a "Single Nucleotide Polymorphism", sometimes referred to as a "variant", which is a DNA sequence variation occurring when a single nucleotide adenine (A), thymine (T), cytosine (C), or guanine (G) in the genome (or other shared sequence) differs between members of a species or paired chromosomes in an individual. SNPs mutate slowly over longer time periods and SNP tests can be used to define specific haplogroups.
- A "Terminal SNP" is the most recent mutation, or change, in the male Y-chromosome, and shared values with other matching male testees define a new sub-haplogroup or subclade representing a new branch in the family tree.
- A "Private Variant" is a SNP or mutation that has occurred in the male line being tested, but has not yet been identified in other matching male testees. A future sharing of a Private Variant with

another matching testee would allow the Private Variant to be named defining a new branch and sub-haplogroup on the family tree.

- A “haplotype” which is also known as a signature, a DNA signature, or a genetic signature, is a set of STR markers on a single chromosome that tend to be inherited together from a single parent. A haplotype can refer to a combination of marker values (alleles) or to a set of SNPs. In the context of Y-chromosome DNA test results, the haplotype usually refers to the marker values obtained from a Y-STR test. The result for each marker is expressed as a number. In surname DNA projects, the term may refer to an individual, group, or modal haplotype or signature.

- A “haplogroup” is a major branch on either the maternal or paternal tree of humankind. Haplogroups are associated with early human migrations; but in the present-day, they are associated with a geographic region or regions. Haplogroups are assigned letters of the alphabet, and refinements consist of additional number and letter combinations. The Dunbar Lineage 2 branch is part of the “R” major haplogroup. A “subclade” is a sub-haplogroup denoted as “R-XXXXXX” for the Dunbar L2 branch with “XXXXXX” typically defined by the name assigned to the Terminal SNP or haplotype.

- A “Big Y” test is a next generation sequencing test introduced by Family Tree DNA to look for SNPs over the entire Y-chromosome. For L2 branch participants, or “testees” in the Project, the Big Y test results define specific sub-haplogroups or subclades younger than the much older R-M222 and R-M269 haplogroups associated with the L2 branch. A Big Y-500 test analyzes about 500 SNPs allowing a definition of the specific haplogroup of the testee’s branch. The currently recommended Big Y-700 test analyzes about 700 SNPs providing about 50 percent more information used to define specific haplogroups.

- The “Time of Most Recent Common Ancestor”, or “TMRCA”, is the number of generations or amount of time in the past when individual testees shared a common ancestor. Since mutations occur at random, the estimate of the TMRCA is not an exact number of generations, but rather a probability that a MRCA occurred in any generation. As more Y-DNA information is compared, the TMRCA estimate becomes more refined. The TMRCA can be predicted for a matching testee using the FTDNATiP and STR test results.

- The “Family Tree DNA Time Predictor”, or “FTDNATiP”, is a mathematical model used to calculate the TMRCA for paternal lineages using mutations defined by differences in test results for STRs or markers in male testees. It incorporates mutation rates specific to each marker, which increases the power and precision of estimates, and it uses both the number of mismatches and the mutation rates of individual markers in calculations. FTDNATiP calculations start counting generations with the parent generation with the father of the person tested as generation one, the paternal grandfather generation two, etc. The FTDNATiP calculator predictions using STR test results can provide a guide to define the times of common ancestors of family branches, but the Big Y test results are required to define the specific branches and relative times of their common ancestors.

The Clan Dunbar organization has sponsored the Dunbar Surname DNA Project (“Project”) since about 2005 using the Family Tree DNA (“FTDNA”) organization and laboratory to conduct Y-DNA testing of male Project participants, or “testees”. Project participants number over 300, and they are all classified in haplogroup R, which migrated out of Africa to west-central Asia about 45,000 to 30,000 years ago; sub-haplogroup R1b, which migrated from west-central Asia into the Iberian peninsula of southwest Europe after the last ice age about 25,000 years ago; and the R1b1a2 western European sub-haplogroup also known as R-M269 associated with the M269 haplotype [Ref. 8]. The major sub-haplogroup branches of the R1b1a2, or R-M269, sub-haplogroup Y-chromosome phylogenetic tree are listed in **Illustration 1** (see illustrations in the last section of this paper).

The Project's L1 branch and L2 branch are both part of this older R-M269 sub-haplogroup, but they are very distantly-related. The L1 branch is part of the older R1b1a2a1a1, or R-U106, sub-haplogroup associated with the U106 haplotype, and it is 3 sub-haplogroups younger than R-M269. The L2 branch is part of the R1b1a2a1a1b4b, or R-M222, sub-haplogroup associated with the M222 haplotype, and it is 6 sub-haplogroups younger than R-M269. The R-M222 sub-haplogroup is the youngest of successive sub-haplogroups of the phylogenetic tree descending from the older R-M269 sub-haplogroup, and its branches are defined in order of older to younger sub-haplogroups as follows in **Illustration 1**: R-M269 > R-L11/S127 > R-L1 > R-P312 > R-L21 > R-M222 [Ref.17].

The R-M222 sub-haplogroup has been studied extensively by independent researchers in the "R-M222 Project" which was established to obtain and study Y-DNA test data to determine origins of common ancestors in time and location. The R-M222 Project is open for males to be tested at a higher level of SNP testing if the males have the following eleven STR marker values, or haplotype signature: DYS390=25; DYS385b=13; DYS392=14; DYS448=18; DYS449=30; DYS464=15-16-16-17; DYS456=17; DYS607=16; DYS413=21-23; DYS534=16; DYS481=25; and DYS714=24. In most cases, the first three STR markers are adequate to establish qualification for the R-M222 Project. If a male has at least two of those three values, and differs by only one at the mismatching marker, it is very probable but not certain that the male has the haplotype characterized by the mutation of the M222 SNP haplotype [Ref. 8].

The origins of the first common male ancestor of the R-M222 sub-haplogroup have been predicted based on the analysis of the larger Y-DNA test database for the R-M222 sub-haplogroup and correlation of the results with historical, geographical, archeological, and genealogy information. A number of studies have been conducted since the early-2000's using the Y-DNA test database associated with the M222 SNP haplotype in the R-M222 Project. One key study was conducted by a team of researchers at Trinity College in Dublin, Ireland, who studied the Y-chromosome test database of men throughout Ireland and found that about 8 percent of the Irishmen tested had the same Y-chromosome, which they called the "Irish Modal Haplotype", or "IMH" that correlated with the Y-DNA test results for individuals with the M222 SNP haplotype associated with the R-M222 sub-haplogroup in the phylogenetic tree. This study found that there was a relatively high frequency of the M222 haplotype among the present-day male population in the counties of northwest Ireland, the Ulster Province in Northern Ireland, and the Lowlands of southwest Scotland as shown in the shaded footprint in **Illustration 2** [Ref. 18].

In the 2008 to 2014 time period, there were only Y-12, Y-25, Y-37, and Y-67 STR marker tests available through FTDNA and the Dunbar L2 branch testees were categorized in the older R-M269 haplogroup. These Y-DNA tests identify mutations, or differences, in the Y-chromosome in 12, 25, 37, and 67 markers, and defined the Genetic Difference ("GD") between male testees as the number of differences in the markers tested. A GD of 0 indicates that the two testees have the same marker values (alleles) for the number of markers tested and they are most likely closely-related in time, and increasing values of GD indicate that the two testees are less closely-related with the TMRCA more distant in the past. Some participants in the Project only completed the less expensive Y-12 and Y-25 tests, but the small number of STR markers tested make their membership in the L2 branch less certain even though they are typically categorized in the older R-M269 haplogroup.

In June, 2008, the author joined the Project and completed a FTDNA Y-67 marker test which confirmed that the author and his Dunbar male ancestors were L2 branch members who carry the M222 haplotype associated with populations in northwest Ireland and southwest Scotland [Ref. 6]. The

author’s Earliest Known Ancestor (“EKA”) and first L2 branch male ancestor in America was “John Dunbar of Philadelphia County (b.1733,d.1778)”. He was born in County Tyrone, Ireland, in 1733 and arrived in Philadelphia in America in 1746 as a young man. His origins in County Tyrone, Ireland, were recorded in several American records as documented in the author’s third House of Dunbar book [Ref. 4]. No records have yet been discovered to identify his specific ancestors in Ireland or earlier in Scotland. However, the Y-DNA test results for the L2 branch participants in the Project have identified matches of testees with ancestry histories which provide clues to the origins of the L2 branch ancestors of John Dunbar of Philadelphia County (b.1733,d.1778) in Ireland and Scotland.

In 2014, FTDNA added the Y-111 STR marker test and designed the more accurate but more expensive Big Y SNP test which were required to define specific younger haplogroups with common ancestors in the past 1000 years. The next generation sequencing Big Y tests were designed by FTDNA to look for SNPs over the entire Y-chromosome in order to explore deep ancestral links on the paternal family tree. The Big Y tests examine thousands of known branch markers as well as millions of places where there may be new branch markers on the paternal family tree in order to provide genealogy researchers with information on close relatives in a specific lineage. These Big Y tests identify the SNPs shared by testees with others in the Big Y test database and also identify SNPs unique to each testee that are not yet matches with others in the database. These unique SNPs then await a match with future Big Y testees that will define a new younger sub-haplogroup, or subclade, within the older R-M222 haplogroup and thus specific branches and common ancestors for L2 branch testees.

The following table summarizes the FTDNA database for the number of matching testees with the author’s test results based on Y-DNA STR marker tests of 12, 25, 37, 67, and 111 markers, and the Big Y test results for the more-extensive tests using 500 or 700 markers.

<b>FTDNA STR Markers</b>	<b>12</b>	<b>25</b>	<b>37</b>	<b>67</b>	<b>111</b>	<b>Big Y</b>
<b>No. matches (all surnames)</b>	<b>1720</b>	<b>255</b>	<b>37</b>	<b>72</b>	<b>14</b>	<b>14</b>
<b>No. matches (Dunbar surnames)</b>	<b>32</b>	<b>25</b>	<b>25</b>	<b>23</b>	<b>14</b>	<b>14</b>

The database is sub-divided into those testees carrying all surnames and those carrying only the Dunbar surname. The number of matching testees for all surnames is 1720 based on the lowest number of 12 STR markers tested for a Y-12 marker test. Some testees never upgraded to tests above 12 markers, and they are not included in the Project because their haplogroup cannot be accurately confirmed. Of those who did upgrade to tests with a larger number of markers, the number of matching testees drops dramatically with 255 matches for 25 marker tests, 37 matches for 37 marker tests, 72 matches for 67 marker tests, and only 14 matches for 111 marker tests. The number of matching testees with the Dunbar surname is only 32 based on the 12 marker test results, 25 for 37 marker tests, and 23 for 67 marker tests. The Y-111 marker and Big Y test results show only 14 matches to the author who carry the Dunbar surname. It is noteworthy that most of the matching testees carrying all surnames who only completed a marker test with less than 111 markers did not match at the 111 marker and Big Y test level. Many of the matching testees carrying the Dunbar surname did not upgrade to the 111 marker and Big Y test level, and thus their matches with the author are still uncertain.

These results show that Y-111 marker tests are a minimum requirement to have high confidence to identify matching testees. As a result, the test results for the lower number of STR marker tests for Y-12, Y-25, Y-37, and Y-67 can only confirm the haplogroups of the matching testees in the much older and much broader R-M269 haplogroup or the older R-M222 haplogroup associated with the Dunbar L2 branch and others carrying the M222 haplotype. The Big Y test is necessary to define the specific younger haplogroups and confirm matching testees in the Dunbar L2 branch in more recent historical times. It would be ideal if all Project participants completed a Big Y test which would allow definitive sub-haplogroups younger than the R-M222 haplogroup to be defined and connections of the L2 sub-branches to be predicted. Until more Big Y tests are completed, the STR marker tests must be used in conjunction with the limited number of Big Y test results to predict the connections of the L2 sub-branches.

In the next section of this paper, the author uses the more recent but limited number of matching Big Y test results for Dunbar L2 participants in the Project to define the specific haplogroups of the author and his matching testees and the connections of the various L2 sub-branches based only on the Y-DNA data. In the subsequent section of this paper, the author uses the entire Y-STR marker test and Big Y test database for Project participants carrying the Dunbar surname to predict more specific connections in time for the various Dunbar L2 sub-branches using the FTDNATiP calculator mathematical tool in conjunction with known ancestry information.

### **BIG Y TEST RESULTS AND MATCHES TO LYLE EUGENE DUNBAR (D-82)**

In October of 2019, the author upgraded from his earlier FTDNA Y-67 marker test to complete a Big Y-700 test in order to provide the information necessary to define the position of his L2 sub-branch within the broader L2 branch of matching testees. The author's Big Y-700 test included an upgrade from 67 markers to the 111 marker level as well as additional STR marker tests to a total of about 700 markers. His Big Y-700 test defined his Terminal SNPs as BY68646 and BY82301 and he was assigned to sub-haplogroup, or subclade, R-BY68646. The author's Big Y-700 test results were then used to identify other matching testees among the L2 branch participants in the Project in order to identify common ancestors and origins of the various L2 branches. **Illustration 3** summarizes the Big Y test results for the author and his Big Y test matches who carry the Dunbar surname as listed in the FTDNA Y-DNA test database. The author is listed as "Lyle Eugene Dunbar (D-82)" using his full name along with his D-82 Project Identifier Number (ID No.). The author's matches are identified by their D-XXX ID number in the Project omitting their full name to comply with the FTDNA and Project privacy requirements. There are a total of 14 participants in the Project with the Dunbar surname who have completed the Big Y test and matched the author's Big Y test results with 12 testees completing the Big Y-700 test and 2 testees completing the Big Y-500 test. The matching testees are listed in groups according to their assigned haplogroups with the oldest haplogroup at the top and youngest haplogroup at the bottom in **Illustration 3**.

The Genetic Distance, or "GD", which is the number of differences, or mutations, between the two sets of STR marker test results of the author and his matching testees, is shown in **Illustration 3** to vary between 2 to 8. A GD of zero indicates there are no differences in the STRs or markers being compared against one another, i.e., an exact match with predicted close relationships in time, and increasing values of GD are indications of less close relationships with common ancestors in the more distance past. A key conclusion based on the Big Y test results is that there is no obvious correlation between the GD and the relative ages of the assigned haplogroups of the matching testees. This is attributed to the fact that mutation rates vary for much larger number of STR markers tested in Big Y

tests. These results show that the GD based on the more limited number of STR markers tested in non-Big Y tests can be misleading in predicting close relations of matching testees.

The number (“No.”) of STR Differences, or mutations, out of the total number of STR markers tested for the author and the matching Big Y testees varies from 3 to 10 as shown in **Illustration 3**. There also doesn’t seem to be a correlation of the relative ages of the various haplogroups with the “No. STR Differences” which again is attributed to the fact that mutation rates vary for the different STR markers tested in Big Y tests.

The Terminal SNPs are listed for the author and each matching testee in **Illustration 3**. The Terminal SNPs are the most recent mutations, or changes, in the male Y-chromosome which represent branches in the L2 family tree and associated haplogroups of the various sub-branches. The haplogroup is typically defined using one of the Terminal SNPs names. The Terminal SNPs are not shared with testees assigned to the older haplogroups, but they are shared with testees assigned to the younger haplogroups.

The number (“No.”) of Private Variants are listed for the author and each matching testee in **Illustration 3**. A Private Variant is a SNP, or mutation, or change, in the male Y-chromosome in the testee, which has not yet been identified in other testees. A future testee who also shares one of these “No. Private Variants” as a Terminal SNP would result in the shared Private Variant SNP to be named defining a new haplogroup for a L2 sub-branch. Among the current matching testees, the “No. Private Variants” varies from 0 to 6 with 4 for the author. Each of these Private Variants represents a possible new branch and associated haplogroup in the testee’s family tree.

The Dunbar Lineage 2 branch family tree for FTDNA Big Y test results for the 14 matching testees with the author is shown in **Illustration 4** with the testees identified by their “D-XXX” Project ID No. This Dunbar L2 branch family tree begins at haplogroup R-BY20512 associated with the Terminal SNPs named BY20512, BY20514, FT145692, FT144894, and FT258160, as shown in the first box at the top of the family tree. The R-BY20512 haplogroup is 10 haplogroups, or subclades, downstream (younger) than the older R-M222 haplogroup associated with the M222 haplotype common to all of the L2 branch participants. The boxes in the family tree identify the Terminal SNPs and associated haplogroups of the common ancestors of L2 sub-branches of the matching Big Y testees in a specific past time period. Some of the boxes list the Terminal SNPs of the matching testee which are associated with the haplogroup of the common ancestor in that time period, e.g., haplotype “BY20513” in the second row of boxes associated with the haplogroup R-BY20513. Other boxes list the Big Y matching testee’s Project ID No. associated with his Terminal SNP along with his assigned haplogroup listed in the next higher row of boxes, e.g., “D-296” is listed in the second row of boxes under the box with the Terminal SNPs named “BY20512, BY20514, FT145692, FT144894, FT258160” listed in the first row box with the assigned haplogroup as “R-BY20512” named after the last haplotype “BY20512” listed among the five haplotypes in the first row box. The vertical spacing of the rows of boxes represents different time periods between the common ancestors, e.g., the oldest haplogroup R-BY20512 is represented by the haplotype listed as “BY20512” in the top row box, and the youngest haplogroup R-FT381714 is represented by the haplotype listed as “FT381714” in the box in the fifth row from the top.

In **Illustration 4**, each horizontal row of boxes represents the common ancestors who are “brothers”, or close relations, for the matching Big Y testees’ different L2 sub-branches in that time period. The “brothers” in the second row of boxes are listed as “R-FT168149 & FT170293” which

represents the branch of the haplogroup R-FT168149 defined by these two Terminal SNPs and the sub-branches of “D-31” and “D-13” in the third row; the sub-branch of “D-296” assigned to haplogroup R-BY20512 defined by its Terminal SNP BY20512, and the haplogroup defined as “R-BY20513”. The “brothers” in the third row descending from the branch “BY20513” include the sub-branch of “D-39”, the sub-branch of “D-327”; the sub-branch of “D-327”; the sub-branch of haplogroup R-BY68646 named for the Terminal SNPs “BY68646 & BY82301”; and the sub-branch of haplogroup R-BY18214 named for the oldest of the Terminal SNPs “BY18214 & BY140967”. In the fourth row of boxes, the “brothers” are represented by the common ancestors of “D-303”, “D-227”, and “D-168” who are assigned to haplogroup R-BY18214 named for the Terminal SNPs “BY18214 and “BY140967”. Also in the fourth row of boxes, the “brothers” are represented by the common ancestors of “Lyle Eugene Dunbar (D-82)” and “D-15” who are assigned to haplogroup “R-BY68646” named for the Terminal SNP “BY68646”, and the common ancestors of haplogroup “R-BY121697” named for the Terminal SNP “BY121797”. In the fifth row of boxes, the “brothers” are listed as the common ancestors of “D-271” and “D-340” who are assigned to haplogroup “R-BY121797” which is named for their oldest Terminal SNP “BY121797”, and the ancestors of “D-318” and “D-332” who are assigned to haplogroup “R-FT381714” which is named for their oldest Terminal SNP “FT381714”,

**Illustration 4** shows the relative ages and relative connections in time of the L2 sub-branches represented by the haplogroups. The 15 matching Big Y testees including the author are categorized into 5 age groups defined from Age Group 1 (oldest) to Age Group 5 (youngest) as shown in the following table.

<b>Haplogroups</b>	<b>Age Group</b>	<b>Matching Big Y Testees with the Author</b>
<b>R-BY20512 &amp; R-FT168149</b>	<b>1 (oldest)</b>	<b>D-296, D-31, and D-13</b>
<b>R-BY20513</b>	<b>2</b>	<b>D-39, D-327, and D-6</b>
<b>R-BY18214</b>	<b>3</b>	<b>D-227, D-303, and D-168</b>
<b>R-BY68646</b>	<b>4</b>	<b>Lyle Eugene Dunbar (D-82) and D-15</b>
<b>R-BY121797 &amp; R-FT381714</b>	<b>5 (youngest)</b>	<b>D-271, D-340, D-318, and D-332</b>

However, the Big Y test results of the current matching testees with the author do not provide sufficient information to define the number of generations and estimated years separating the common ancestors of these L2 sub-branches and thus a prediction of their TMRCA. Thus, the author has used the STR marker test database for his L2 branch matching testees along with their ancestry information to complement the limited Big Y test results database in an attempt to predict the TMRCA and the connections in time of these L2 sub-branches and their assigned haplogroups.

## **PREDICTIONS OF TMRCA FOR L2 SUB-BRANCHES AND HAPLOGROUPS**

The FTDNA has developed a statistical mathematical model called the FTDNATiP calculator that can be used to predict the probability of the TMRCA for matching testees using the STR marker test database. These TMRCA predictions are used in conjunction with known ancestry information and Big Y test results to estimate the time periods of common ancestors of the various L2 sub-branches and the most likely haplogroups of non-Big Y matching testees. The FTDNA Y-DNA database identifies a number of male “testees” who completed the Y-12, Y-25, Y-37, Y-67, Y-111 marker tests as well as those completing Big Y tests who are listed as matches to the author’s test results based on their GD and their assigned haplogroups. Many of these testees joined as participants in the Dunbar Surname DNA Project and their test results are published on the Clan Dunbar website on the Dunbar Surname DNA Project (“Project”) page using the testees’ individual “D-XXX” Project Identifier Number (ID No.). The author’s Y-DNA test results in the Project database are included in this paper using the author’s full name and Project Identifier Number as “Lyle Eugene Dunbar (D-82)”. **Illustrations 5a and 5b** summarize the test results based on the more detailed Big Y test results and the Y-STR non-Big Y test results, respectively, for the author and his L2 branch matches, who are listed by their Project ID No. omitting their name to meet the Project privacy requirements. These test results include the predictions of the TMRCA between the author’s L2 branch and his matching testees’ L2 branches using the FTDNATiP calculator mathematical tool. For the 14 Big Y testees, the TMRCA predictions are based on the Y-111 STR marker test results for 12 Big Y-700 matching testees, and 2 Big Y-500 matching testees, as shown previously in **Illustration 3**.

The FTDNATiP predictions in **Illustrations 5a and 5b** list the probability of the matching testee’s TMRCA in a specific generation (“Gen”) measured from the birth year of 1945 of the author who is listed as “Lyle Eugene Dunbar (D-82)”. The TMRCA predictions shown in **Illustration 5a** for the 14 L2 Big Y matching testees with the author include 1 Big Y-500 matching testee with only a previous Y-37 marker test and 13 Big Y matching testees with Y-111 marker tests. The TMRCA predictions shown in **Illustration 5b** for non-Big Y matching testees include 12 matching testees with Y-37, Y-67, and Y-111 marker tests and 3 matching testees with only Y-12 marker tests. No FTDNATiP predictions were made for the 3 non-Big Y matching testees with only Y-12 marker test results because the FTDNA database shows many matching testees at that marker level who did not match at the higher marker levels. However, the several non-Big Y matching testees with Y-12 and Y-37 marker test results are still listed in **Illustration 5b** because their Project ancestry information shows that they are likely L2 branch members and if they completed a future upgrade to a Big Y test they would likely confirm their assignment to the L2 branch haplogroups defined in this paper.

### **Age Group 4 Calibration Analyses and FTDNATiP Predictions.**

The first predictions of TMRCA using the FTDNATiP calculator and the ancestry information were for matching testees with the author who have completed a Big Y test and are assigned to the author’s haplogroup R-BY68646 (Age Group 4) or have completed either Y-67 or Y-111 STR tests with known common ancestors with the author. The matching testees to Lyle Eugene Dunbar (D-82) include D-15 who is a Big Y-700 testee with results listed in **Illustration 5a** and D-7 and D-68 who are Y-67 testees with results listed in **Illustration 5b**. These TMRCA predictions will be used to calibrate the FTDNATiP calculator using actual TMRCA data based on known ancestry for these matching testees.

**Lyle Eugene Dunbar (D-82)** completed FTDNA test types of the Y-111 marker test, FF (Family Finder) test, and his upgraded Big Y-700 test, and his assigned haplogroup is R-BY68646 based on his Big Y-700 test results as shown in **Illustration 3**. The listed ancestors of Lyle Eugene Dunbar (D-82) are based on the information documented in the author's third and fourth House of Dunbar books [Ref. 4 and 5]. The Earliest Known Ancestor ("EKA") of Lyle Eugene Dunbar (D-82) is "John Dunbar of Philadelphia County (b.1733,d.1778)", who was born in 1733 in County Tyrone, Ireland; arrived in Philadelphia in 1746 as a young man; married Mary Rupert (b.1744,d.1829) in 1769, lived in Robins Mill, PA, in Philadelphia County, PA, and then in Hummelstown, PA; and was a soldier in the Revolutionary War who died in 1778 [Ref. 4]. His successive ancestors include his 2<sup>nd</sup> son, Robert Dunbar (b.1771,d.1831) of Pennsylvania and Ohio; his 4<sup>th</sup> son, Lewis Dunbar (b.1803,d.1876) of Montgomery County, Indiana; his 3<sup>rd</sup> son, John Adam Dunbar (b.1828,d.1913) of Washington County, Iowa; his 1<sup>st</sup> son, Lewis Cason Dunbar (b.1850,d.1950) of Brighton, Iowa; his 2<sup>nd</sup> son, Frank Albert Dunbar (b.1878,d.1953) of Keota, Iowa; and his 4<sup>th</sup> son, Dale Burton Dunbar (b.1913,d.1993), of Fairfield, Iowa; and his 2<sup>nd</sup> son who is the author, Lyle Eugene Dunbar (D-82) of San Diego, California, who was born in 1945.

**D-15** is a Big Y matching testee with Lyle Eugene Dunbar (D-82) with a GD 4, or 4 mutations or differences in their Y-111 STR markers, and 5 of 598 mutations or differences in their Big Y-700 markers as shown in **Illustration 3**, and he is assigned to the same haplogroup R-BY68646 as the author, which is the fourth younger (Age Group 4) of the haplogroups assigned to the Big Y matching testees. The ancestors of D-15 are based on his input to the author and the extensive research documented in the author's fourth House of Dunbar book [Ref. 5]. The author has confirmed that the EKA of D-15 is John Dunbar of Philadelphia County (b.1733,d.1778), who was born in County Tyrone, Ireland, in 1733, and arrived in Philadelphia in 1746 as a young man. The successive ancestors include his 2<sup>nd</sup> son, Robert Dunbar (b.1771,d.1831) of Pennsylvania and Ohio; his 4<sup>th</sup> son, Lewis Dunbar (b.1803,d.1876) of Montgomery County, Indiana; his 5<sup>th</sup> son, Elias Dunbar (b.1835,d.1861); his only son, Elias Peter Dunbar (b.1861,d.1941); his 5<sup>th</sup> son, Roscoe Abner Dunbar (b.1899,d.1956); and his son is D-15. Lewis Dunbar (b.1803,d.1876) of Montgomery County, Indiana, is the most recent common ancestor, or "MRCA", of D-15 and Lyle Eugene Dunbar (D-82). It is noted that the GD of 4 indicates a more distant relationship and thus does not correlate with the known more-recent common ancestor and their assignment to the same haplogroup based on Big Y test results.

**D-7** has known common ancestors and matching Y-DNA test results with Lyle Eugene Dunbar (D-82) with a GD 0 match of his Y-67 marker test as shown in **Illustration 5b**. This means there were no mutations or differences in their Y-DNA test results based on the first 67 markers and thus a projected close match. D-7 didn't complete the more detailed Big Y-700 test and thus his specific haplogroup is only shown as the older R-M269 haplogroup. The ancestors of D-7 are based on extensive research documented in the author's third House of Dunbar book [Ref. 4]. The author's research has resulted in several proposed changes to the ancestry information shown on the Dunbar Surname DNA Project website patriarchs page including: (1) the EKA listed as "William Dunbar, b. ? Northumberland PA, d. prior to Aug 1769" is probably incorrect based on the author's research and genealogy information, and (2) some of the information for the second known ancestor "John Dunbar, b. May 1730, Robins Mill PA, m. Mary Coss, d. 1777/78, Dauphin Co., PA" is also likely incorrect and should probably be the same EKA as that of the author. This EKA is most likely "John Dunbar of Philadelphia County (b.1733,d.1778)", who was born in 1733 in County Tyrone, Ireland; arrived in Philadelphia in 1746 as a young man; married Mary Rupert (b.1744,d.1829) in 1769; lived in Robins Mill, PA, in Philadelphia County, PA, and then in Hummelstown, PA in 1773-1778; and was a soldier

in the Revolutionary War who died in 1778 [Ref. 4]. The father of this EKA has not yet been identified, but he most likely resided in County Tyrone, Ireland, and never migrated to America. The author's research confirms the successive ancestor as George Dunbar (b.1771,d.1859), who was the 1<sup>st</sup> son of "John Dunbar of Philadelphia County (b.1733,d.1778)" and the older brother of the author's second known ancestor "Robert Dunbar (b.1771, d.1831) of Pennsylvania and Ohio". The next ancestor was his 3rd son, William Dunbar (b.1806, d.1883), who married Harriet Tofler. Additional ancestors of D-7 have not yet been identified by the author or provided to the Project by D-7. If D-7 had completed a Big Y-700 test, his results would likely have placed him in the same haplogroup R-BY68646 as Lyle Eugene Dunbar (D-82) and D-15 because of their common ancestor, John Dunbar of Philadelphia County (b.1733,d.1778). It is also noted that the GD of 0, which indicates a very close relationship with the author based on his 67 marker test results, does not correlate with the GD of 4 for D-15, which indicates a more distant relationship with the author even though known ancestry information indicates a closer relationship of D-15 than D-7.

**D-68** has known common ancestors and matching Y-DNA test results with Lyle Eugene Dunbar (D-82) with a GD 2 match of his Y-67 marker test as shown in **Illustration 5b**. This means there were only 2 mutations or differences in their Y-DNA test results based on the first 67 markers and thus a projected close-relationship. D-68 didn't complete the more detailed Big Y-700 test and his specific haplogroup is only shown as the older R-M269 haplogroup. The ancestors of D-68 are based on input from his family along with the extensive research documented in the author's fourth House of Dunbar book [Ref. 5]. The author has confirmed that the EKA of D-68 is John Dunbar of Philadelphia County (b.1733,d.1778), who is the same as the 7<sup>th</sup>-generation ancestor and EKA of Lyle Eugene Dunbar (D-82). His successive ancestors include his 2<sup>nd</sup> son, Robert Dunbar (b.1771,d.1831) of Pennsylvania and Ohio; his 4<sup>th</sup> son, Lewis Dunbar (b.1803,d.1876) of Montgomery County, Indiana; his 8<sup>th</sup> son, Marion Dunbar (b.1840,d.1894); his 1<sup>st</sup> son, John William Dunbar (b.1863,d.1952); and his son D-68 who was still living in 2005. The "Most Recent Common Ancestor", or MCRA, of D-68 and Lyle Eugene Dunbar (D-82) is Lewis Dunbar (b.1803,d.1876) of Montgomery County, Indiana. If D-68 had completed a Big Y-700 test, his results would likely have placed him in the same haplogroup R-BY68646 as Lyle Eugene Dunbar (D-82) and D-15 because of their common ancestor, Lewis Dunbar (b.1803,d.1876) of Montgomery County, Indiana. Again the GD of 2 based on 67 marker test results is inconsistent with known ancestry information and the GD of 4 for D-15 is based on his Big Y test results.

The author used the FTDNATiP calculator for the Y-37, Y-67, and Y-111 marker or STR test results for each matching testee with the author, Lyle Eugene Dunbar (D-82), to predict the probabilities for their TMRCA for each generation after the author's birth in 1945. In order to define the specific time period for the TMRCA for a matching Dunbar L2 branch testee, the average years for each generation must be defined. FTDNA recommends an average of about 30 years, based on their extensive test database, but this can vary somewhat in some cases. The FTDNATiP calculator is typically used in cases where there is no known genealogy information for ancestors to define the TMRCA or no Big Y test result to define the specific haplogroup. The author's methodology included first calibrating the FTDNATiP prediction methodology using test results for matching testees with known ancestry information in his L2 branch. There are three Dunbar L2 branch matching testees with Lyle Eugene Dunbar (D-82) with known common ancestors that were used to calibrate the FTDNATiP calculator including: D-7, D-68, and D-15.

The initial calibration analysis for the FTDNATiP calculator used the Y-DNA test data and known ancestry information for D-7, D-68, and D-15 assuming no common ancestors with Lyle Eugene Dunbar (D-82) in generations 6, 4, and 4, respectively, after his birth year of 1945 based on the known common ancestry information. The predicted TMRCA for the common ancestor between these 3 matching testees and Lyle Eugene Dunbar (D-82) shown in **Illustrations 5a and 5b** include:

- A probability of 43%, 68%, and 82% is predicted for the TMRCA corresponding to the 6, 7, and 8 generations, respectively, for D-7, as shown in **Illustration 5b**. This indicates the TMRCA at about 180 to 240 years before the birth year in 1945 of Lyle Eugene Dunbar (D-82), or the 1705 to 1765 time period using the FTDNA-recommended 30 years per generation. The actual TMRCA is 212 years from the birth year of 1945 of Lyle Eugene Dunbar (D-82) to the birth year of 1733 for the common ancestor, John Dunbar of Philadelphia County (b.1733,d.1778), which is 30.3 years per generation for the 7 generations. The known common ancestor in generation 7 suggests a value of 68% cumulative probability represents the most likely TMRCA using the FTDNATiP calculator methodology.

- A probability of 45%, 60%, 73%, and 82% is predicted for the TMRCA corresponding to the 4, 5, 6, and 7 generations, respectively, for D-15, as shown in **Illustration 5a**. This indicates the TMRCA at about 120 to 210 years before the birth year in 1945 for Lyle Eugene Dunbar (D-82), or the 1735 to 1820 time period using the FTDNA-recommended 30 years per generation. The actual TMRCA is 142 years from the birth year of Lyle Eugene Dunbar (D-82) in 1945 to the birth year of Lewis Dunbar (b.1803,d.1876) of Montgomery County, Indiana, in 1803, which is 28.4 years per generation for the 5 generations. The known ancestry information with 5 generations between 1945 and 1803 shows that a 60% probability represents the most likely TMRCA using the FTDNATiP calculator methodology.

- A probability of 43%, 68%, 82%, and 90% is predicted for the TMRCA corresponding to the 4, 5, 6, and 7 generations, respectively, for D-68, as shown in **Illustration 5b**. This indicates the TMRCA at about 120 to 210 years before the birth year in 1945 of Lyle Eugene Dunbar (D-82), or the 1735 to 1820 time period using the FTDNA-recommended 30 years per generation. The actual TMRCA is 142 years from the birth year of 1945 of Lyle Eugene Dunbar (D-82) to the birth year of 1803 for the common ancestor, Lewis Dunbar (b.1803,d.1876) of Montgomery County, Indiana, which is 28.4 years per generation for the 5 generations. The known common ancestor in generation 5 suggests a value of 68% cumulative probability represents the most likely TMRCA using the FTDNATiP calculator methodology.

The results of these calibration analyses include an average of 65% cumulative probability, which is the “nominal” value used for the generation of the TMRCA for the FTDNATiP predictions for this L2 sub-branch’s matching testees for this haplogroup R-BY68646. The 29 years per generation for the actual values is close to the FTDNA-recommended value, and 30 years per generation is the “nominal” value used to predict the time of the TMRCA using the FTDNATiP calculator.

**Illustration 6** shows the fourth younger Age Group 4 of the Dunbar L2 sub-branch family tree for haplogroup R-BY68646 based on Y-DNA and Big Y-700 test results, known ancestry information, and FTDNATiP predictions. Haplogroup R-BY68646 was assigned to Lyle Eugene Dunbar (D-82) and D-15, who was the only other matching testee in his branch who completed a Big Y test, based on their common Terminal SNPs listed as BY68646 and BY82301. Other matching testees based on Y-DNA STR marker tests and known ancestry were added to this Dunbar L2 sub-branch including D-7 and D-68. In **Illustration 6**, the known ancestry information for each Y-DNA matching testee is used

to construct the family tree back in time to the author's 7<sup>th</sup>-generation EKA listed as John Dunbar of Philadelphia County (b.1733,d.1778), who was born in County Tyrone, Ireland, in 1733. Then the earlier ancestors are inserted in the family tree listing their names as "UnKnown (bc.XXXX)" using their estimated birth year "XXXX" based on an assumed number of years between each unknown generation. In haplogroup R-BY68646 for the L2 sub-branch of Lyle Eugene Dunbar (D-82), the unknown ancestors are assigned a generation number and specific birth year after the 7<sup>th</sup>-generation ancestor, John Dunbar of Philadelphia County (b.1733,d.1778), assuming an average of 30 years per generation including: his father as "8<sup>th</sup>-Unknown (bc.1703)"; his grandfather as "9<sup>th</sup>-Unknown (bc.1673)"; his 1<sup>st</sup>-great-grandfather as "10<sup>th</sup>-Unknown (bc.1643)"; his 2<sup>nd</sup>-great-grandfather as "11<sup>th</sup>-Unknown (bc.1613)", and his 3<sup>rd</sup>-great-grandfather as "12<sup>th</sup>-Unknown (b.1583)". These specific unknown ancestors are used as placeholders in the author's L2 sub-branch family tree to define common ancestors and TMRCA's of the various Dunbar L2 sub-branch haplogroups. The "10<sup>th</sup>-Unknown (bc.1643)" is predicted to be the TMRCA in about 1643 for the youngest Age Group 5 for haplogroups R-BY121797 and R-FT381714; the "12<sup>th</sup>-Unknown (bc.1583)" is predicted to be the TMRCA in about 1583 for the older Age Groups 2, 3, and 4 for haplogroups R-BY20513, R-BY18214, and R-BY68646; and the "13<sup>th</sup>-Unknown (bc.1553)" is predicted to be the TMRCA in about 1553 for the oldest Age Group 1 for haplogroups R-BY20512 and R-FT168149 as described in a subsequent section of this paper.

### **Age Group 5 Calibration Analyses and FTDNATiP Predictions**

The next predictions of common ancestors are focused on the youngest (Age Group 5) Dunbar L2 sub-branch for haplogroup R-BY121797 assigned to D-271 and D-340 and haplogroup R-FT381714 assigned to D-318 and D-332 based on their Big Y test results. Other matching testees based on Y-DNA STR marker tests and known ancestry were added to this Dunbar L2 sub-branch including D-271 and D-273.

Prior to predicting common ancestors and TMRCA's with other L2 sub-branches, another calibration analysis was conducted using the FTDNATiP calculator with the Y-DNA STR test data and known ancestry information for D-318, D-332, D-340, and D-260 for matches to D-271. The ancestry data shows a common ancestor of Robert Dunbar Sr (bc.1760, da.1839) in generation 5 after the birth year of 1936 for D-271. The results of the predictions of TMRCA for the 4 matching testees with D-271, based on separate calculations using the FTDNATiP calculator, are as follows:

- A probability of 44%, 69%, and 84% is predicted for the TMRCA corresponding to the 4, 5, and 6 generations, respectively, for D-318. This indicates the TMRCA at about 120 to 180 years before the birth year in 1936 of D-271, or the 1756 to 1816 time period using an assumed 30 years per generation. The actual TMRCA is approximately 176 years from the birth year of D-271 to the birth year of 1760 for the common ancestor, Robert Dunbar Sr (bc.1760,da,1839), which is 35.2 years per generation for the 5 generations. The known common ancestor in generation 5 suggests a value of 69% cumulative probability represents the most likely TMRCA using the FTDNATiP calculator methodology.

- A probability of 34%, 58%, and 74% is predicted for the TMRCA corresponding to the 4, 5, and 6 generations, respectively, for D-332. This indicates the TMRCA at about 120 to 180 years before the birth year in 1936 of D-271, or the 1756 to 1816 time period using an assumed 30 years per generation. The actual TMRCA is approximately 176 years from the birth year of D-271 to the birth year of 1760 for the common ancestor, Robert Dunbar Sr (bc.1760,da,1839), which is 35.2 years per

generation for the 5 generations. The known common ancestor in generation 5 suggests a value of 58% cumulative probability represents the most likely TMRCA using the FTDNATiP calculator methodology.

- A probability of 44%, 69%, and 84% is predicted for the TMRCA corresponding to the 4, 5, and 6 generations, respectively, for D-340. This indicates the TMRCA at about 120 to 180 years before the birth year in 1936 of D-271, or the 1756 to 1816 time period using an assumed 30 years per generation. The actual TMRCA is approximately 176 years from the birth year of D-271 to the birth year of 1760 for the common ancestor, Robert Dunbar Sr (bc.1760,da,1839), which is 35.2 years per generation for the 5 generations. The known common ancestor in generation 5 suggests a value of 69% cumulative probability represents the most likely TMRCA using the FTDNATiP calculator methodology.

- A probability of 53%, 78%, and 90% is predicted for the TMRCA corresponding to the 4, 5, and 6 generations, respectively, for D-260. This indicates the TMRCA at about 120 to 180 years before the birth year in 1936 of D-271, or the 1756 to 1816 time period using an assumed 30 years per generation. The actual TMRCA is approximately 176 years from the birth year of D-271 to the birth year of 1760 for the common ancestor, Robert Dunbar Sr (bc.1760,da,1839), which is 35.2 years per generation for the 5 generations. The known common ancestor in generation 5 suggests a value of 78% cumulative probability represents the most likely TMRCA using the FTDNATiP calculator methodology.

These calibration analyses showed the predicted generation of the TMRCA at an average of 69% and an actual average of 35 years per generation to the common ancestor. These calibration results are compared to those previously conducted for matching testees in the author's L2 sub-branch of 65% for the cumulative probability of the TMRCA for the FTDNATiP predictions and 29 years for the time period of each generation to predict the time of the TMRCA using the FTDNATiP calculator. Based on the two calibration analyses described in the preceding pages, the author then used the FTDNATiP calculator with assumed representative nominal values of "68% cumulative probability" and "30-year average per generation" to predict the probabilities for the TMRCA between each matching testee and the author listed as Lyle Eugene Dunbar (D-82) in each generation after the author's birth year of 1945. The FTDNATiP predictions and ancestry data are first presented for each of the matching testees in the youngest Age Group 5 including the four Big Y testees as well as several matching testees based on non-Big Y STR test data.

**D-271** is a Big Y matching testee with Lyle Eugene Dunbar (D-82) with a GD 3, or 3 mutations or differences in their Y-111 STR markers, and 7 of 518 mutations or differences in their Big Y-700 markers, as shown in **Illustrations 3 and 5a**, and he is assigned to haplogroup R-BY121797 which is the fifth younger (Age Group 5) of the haplogroups assigned to the Big Y matching testees. The ancestors of D-271 are based on the information provided to the author by the account manager, Steve Arthur, whose wife is a 1<sup>st</sup> cousin of D-271 [Ref. 1]. The EKA of D-271 was his 5<sup>th</sup>-generation ancestor, Robert Dunbar Sr (bc.1760,da.1839), who was born about 1760 in Chester County, Pennsylvania; he married in 1790 to Hannah Maxwell, who was the youngest daughter of John and Margaret Maxwell; they lived in Gap Mills, Monroe County, Virginia (now West Virginia); and he died after 1839. Successive ancestors included: John Matthew Dunbar (b.1790); Abner Thomas Dunbar (b.1847,d.1912); George Henry Dunbar (b.1881,d.1965); his father, Lewis Abner (Luke) Dunbar (b.1913,d.1992); and his son is D-271.

The FTDNATiP calculator was used with a “TMRCA after Gen” of 7 because there is no common ancestor of D-271 for 7 generations with Lyle Eugene Dunbar (D-82) based on known ancestry information. The FTDNATiP calculator predicts a cumulative probability of 41%, 66%, and 81% at 7, 8, and 9 generations, respectively, as shown in **Illustration 5a**, with 8 to 9 generations at 66% to 81% as the range of probabilities of the most likely TMRCA based on the calibration analyses. This indicates the most likely TMRCA of about 240 to 270 years before the 1945 birth year of Lyle Eugene Dunbar (D-82), or the 1675 to 1705 time period assuming the nominal 30 years per generation from the calibration analyses.

This prediction of 8 to 9 generations and the years 1675 to 1705 for the most likely TMRCA is consistent with the younger (Age Group 5) haplogroup R-BY121797 assigned to D-271 and the next older (Age Group 4) haplogroup R-BY68646 assigned to Lyle Eugene Dunbar (D-82). Their common ancestor is about 1 to 2 generations earlier than the author’s EKA and 7<sup>th</sup>-generation ancestor, John Dunbar of Philadelphia County (b.1733,d.1778), who was born in County Tyrone, Ireland, in 1733 and arrived in Philadelphia in 1746. The EKA of D-271 was his 5<sup>th</sup>-generation ancestor, Robert Dunbar Sr (bc.1760,da.1839), who was born about 1760 in Chester County, Pennsylvania. The FTDNATiP predictions suggest that the earliest possible common ancestor could be the 10<sup>th</sup>-generation unknown ancestor of Lyle Eugene Dunbar (D-82), who is called “10<sup>th</sup>-UnKnown (bc.1643)” and the great-grandfather of John Dunbar of Philadelphia County (b.1733,d.1778).

**D-340** is a Big Y matching testee with Lyle Eugene Dunbar (D-82) with a GD 2, or 2 mutations or differences in their Y-111 STR markers, and 8 of 601 mutations or differences in their Big Y-700 markers, as shown in **Illustrations 3 and 5a**, and he is also assigned to haplogroup R-BY121797 which is the fifth younger (Age Group 5) of the haplogroups assigned to the Big Y matching testees. The ancestors of D-340 are based on ancestry information provided to the Dunbar Surname DNA Project by the account manager, Mary Abel, who is the niece of D-340. The EKA of D-340 was his 5<sup>th</sup>-generation ancestor, Robert Dunbar Sr (bc.1760,da.1839), who was born about 1760 in Chester County, Pennsylvania; he married in 1790 to Hannah Maxwell, who was the youngest daughter of John and Margaret Maxwell; they lived in Gap Mills, Monroe County, Virginia (now West Virginia); and he died after 1839. Successive ancestors included: William M. Dunbar (b.1792,d.1875); John Adams Dunbar (b.1824,d.1903); James Edgar Dunbar (b.1865,d.1950); his father, George Arthur Dunbar (b.1900,d.1978); and his son is D-340.

The FTDNATiP calculator was used with a “TMRCA after Gen” of 7 because there is no common ancestor of D-340 for 7 generations with Lyle Eugene Dunbar (D-82) based on known ancestry information. The FTDNATiP calculator predicts a cumulative probability of 47%, 73%, and 86% at 7, 8, and 9 generations, respectively, as shown in **Illustration 5a**, with 8 to 9 generations at 73% to 86% as the range of probabilities of the most likely TMRCA based on the calibration analyses. This indicates the most likely TMRCA of about 240 to 270 years before the 1945 birth year of Lyle Eugene Dunbar (D-82), or the 1675 to 1705 time period assuming the nominal 30 years per generation from the calibration analyses.

This prediction of 8 to 9 generations and the years 1675 to 1705 for the most likely TMRCA is consistent with the younger (Age Group 5) haplogroup R-B121797 assigned to D-340 and the next older (Age Group 4) haplogroup R-BY68646 assigned to Lyle Eugene Dunbar (D-82). Their common ancestor is about 1 to 2 generations earlier than the author’s EKA and 7<sup>th</sup>-generation ancestor, John Dunbar of Philadelphia County (b.1733,d.1778), who was born in County Tyrone, Ireland, in 1733 and arrived in Philadelphia in 1746. The EKA of D-340 was his 5<sup>th</sup>-generation ancestor, Robert Dunbar Sr

(bc.1760,da.1839), who was born about 1760 in Chester County, Pennsylvania. The FTDNATiP predictions suggest that the earliest possible common ancestor could be the 10<sup>th</sup>-generation unknown ancestor of Lyle Eugene Dunbar (D-82), who is called “10<sup>th</sup>-UnKnown (bc.1643)” and the great-grandfather of John Dunbar of Philadelphia County (b.1733,d.1778).

**D-318** is a Big Y matching testee with Lyle Eugene Dunbar (D-82) with a GD 4, or 4 mutations or differences in their Y-111 STR markers, and 5 of 610 mutations or differences in their Big Y-700 markers as shown in **Illustrations 3 and 5a**, and he is assigned to haplogroup R-FT381714 which is the fifth younger (Age Group 5) of the haplogroups assigned to the Big Y matching testees. The ancestors of D-318 are based on information provided to the author by the account manager, Martha Dunbar Reinhart, who is a second cousin of D-318. She has assembled genealogy information on the Dunbar Lineage 2 branch of D-318 and others in this L2 branch [Ref. 11]. The EKA of D-318 is his 5<sup>th</sup>-generation EKA, Robert Dunbar Sr (bc.1760,da.1839), who was born about 1760 in Chester County, Pennsylvania; he married in 1790 to Hannah Maxwell, who was the youngest daughter of John and Margaret Maxwell; they lived in Gap Mills, Monroe County, Virginia (now West Virginia); he died after 1839; and he was also the EKA of D-271. His Dunbar Lineage 2 branch male line ancestors then follow a parallel branch to that of D-271 with successive ancestors as follows: Robert Dunbar Jr (b.1801,d.1870), who married Elizabeth Mary Steele; Thomas Madison Dunbar (b.1834,d.1910), whose first wife was Sarah Frances Jones; their son, Lewis Thornton Dunbar (b.1870,d.1939), who married Adaline Huffman; their son, Chan Hamilton Dunbar (b.1902,d.1986), who married Daisy Broughman; and their son is D-318 who was still living in 2005.

The FTDNATiP calculator was used with a “TMRCA after Gen” of 7 because there is no common ancestor of D-318 for 7 generations with Lyle Eugene Dunbar (D-82) based on known ancestry information. The FTDNATiP calculator predicts a cumulative probability of 34%, 58%, and 74% at 7, 8, and 9 generations, respectively, as shown in **Illustration 5a**, with 8 to 9 generations at 58% to 74% as the range of probabilities of the most likely TMRCA based on the calibration analyses presented in the previous section. This indicates the most likely TMRCA of about 240 to 270 years before the 1945 birth year of Lyle Eugene Dunbar (D-82), or the 1675 to 1705 time period assuming the nominal 30 years per generation.

This prediction of 8 to 9 generations and the years 1675 to 1705 for the most likely TMRCA is consistent with the younger (Age Group 5) haplogroup R-FT381714 assigned to D-318 and the next older (Age Group 4) haplogroup R-BY68646 assigned to Lyle Eugene Dunbar (D-82). The FTDNATiP predictions suggest that the earliest possible common ancestor could be the 10<sup>th</sup>-generation unknown ancestor of Lyle Eugene Dunbar (D-82), who is called “10<sup>th</sup>-UnKnown (bc.1643)” and the great-grandfather of John Dunbar of Philadelphia County (b.1733,d.1778).

**D-332** is a Big Y matching testee with Lyle Eugene Dunbar (D-82) with a GD 6, or 6 mutations or differences in their Y-111 STR markers, and 8 of 602 mutations or differences in their Big Y-700 markers as shown in **Illustrations 3 and 5a**, and he is assigned to haplogroup R-FT318714 which is the fifth younger (Age Group 5) of the haplogroups assigned to the Big Y matching testees. The ancestors of D-332 are based on information provided to the author by the account manager, Martha Dunbar Reinhart, who also manages the account of D-318 and several other related parties. She has assembled genealogy information on the ancestors of D-332 and others in this Dunbar L2 branch [Ref. 11]. The EKA of D-332 is his 6<sup>th</sup>-generation EKA, Robert Dunbar Sr (bc.1760,da.1839), who was born about 1760 in Chester County, Pennsylvania; he married in 1790 to Hannah Maxwell, who was the youngest daughter of John and Margaret Maxwell; they lived in Gap Mills, Monroe County, Virginia

(now West Virginia); he died after 1839, and he was also the EKA of D-271 and D-318. His Dunbar Lineage 2 branch male line ancestors then follow a parallel branch to that of D-271 and D-318 with Robert Dunbar Jr (b.1801,d.1870), who married Elizabeth Mary Steele; and Thomas Madison Dunbar (b.1834,d.1910), whose second wife was Cynthia Alice Jane, and then his line of descent follows a parallel path to that of D-318 with their son, Earnest Monroe Dunbar (b.1892,d.1948); his son, Mr. Dunbar; his son, Mr. Dunbar Jr; and his son is D-332 who was still living in 2005.

The FTDNATiP calculator was used with a “TMRCA after Gen” of 7 because there is no common ancestor of D-332 for 7 generations with Lyle Eugene Dunbar (D-82) based on known ancestry information. The FTDNATiP calculator predicts a cumulative probability of 49%, 66%, and 78% at 8, 9, and 10 generations, respectively, as shown in **Illustration 5a**, with 9 to 10 generations at 66% to 78% as the range of probabilities of the most likely TMRCA based on the calibration analyses presented in the previous section. This indicates the most likely TMRCA of about 270 to 300 years before the 1945 birth year of Lyle Eugene Dunbar (D-82), or the 1645 to 1675 time period assuming the nominal 30 years per generation.

This prediction of 9 to 10 generations and the years 1645 to 1675 for the most likely TMRCA is consistent with the younger (Age Group 5) haplogroup R-FT318714 assigned to D-332, and the next older (Age Group 4) haplogroup R-BY68646 assigned to Lyle Eugene Dunbar (D-82). However, the 9 to 10 generations is inconsistent with the 8 to 9 generations predicted for D-271 assigned to haplogroup R-BY121797 and D-318 assigned to haplogroup R-FT318714. The reason may be due to D-332 being 1 generation further removed from the common ancestor with D-318 and D-271, and this may account for a larger number of mutations and the slightly older predicted TMRCA compared to D-318 and D-271. The FTDNATiP predictions suggest that the earliest possible common ancestor could be the 10<sup>th</sup>-generation unknown ancestor of Lyle Eugene Dunbar (D-82), who is called “10<sup>th</sup>-UnKnown (bc.1643)” and the great-grandfather of John Dunbar of Philadelphia County (b.1733,d.1778).

**D-273** is a matching testee with Lyle Eugene Dunbar (D-82) based on his 111-marker test result which shows a GD 6, or 6 mutations or differences in their Y-DNA STR test results, as shown in **Illustration 5b**, and he is assigned to the R-BY199 haplogroup based on his BY199 SNP test. However, his ancestry information indicates a close-relationship to D-318 and several other Big Y testees who were assigned to the fifth younger (Age Group 5) haplogroups R-BY121797 and R-FT318714. The ancestors of D-273 are based on information provided to the author by Martha Dunbar Reinhart, who is a half-first cousin of D-273 and manager of the account of D-318 and D-332. She has assembled genealogy information on the Dunbar L2 branch of D-273, D-318, and D-332 in this Dunbar Lineage 2 branch [Ref. 11]. The EKA of D-273 was his 5<sup>th</sup>-generation EKA, Robert Dunbar Sr (bc.1760,da.1839), who was born about 1760 in Chester County, Pennsylvania; he married in 1790 to Hannah Maxwell, who was the youngest daughter of John and Margaret Maxwell; they lived in Gap Mills, Monroe County, Virginia (now West Virginia); he died after 1839, and he was also the earliest known ancestor of D-271, D-318, and D-332. His Dunbar L2 branch male line ancestors then follow a parallel branch to that of D-271 and D-318 with successive ancestors as follows: Robert Dunbar Jr (b.1801,d.1870), who married Elizabeth Mary Steele; Thomas Madison Dunbar (b.1834,d.1910), whose first wife was Sarah Frances Jones; and then follows a parallel line of D-318 with their son, John Calvin Dunbar (b.1871,d.1933), who married first to Nannie Redman; their son, Vivian Hansborough Dunbar, who married Tula Lee Sloane; and then their son is D-273.

The FTDNATiP calculator was used with a “TMRCA after Gen” of 7 because there is no common ancestor of D-273 for 7 generations with Lyle Eugene Dunbar (D-82) based on known

ancestry information. The FTDNATiP calculator predicts a cumulative probability of 49%, 66%, and 78% at 8, 9, and 10 generations, respectively, as shown in **Illustration 5b**, with 9 to 10 generations at 66% to 78% as the range of probabilities of the most likely TMRCA based on the calibration analyses presented in the earlier section. This indicates the most likely TMRCA of about 270 to 300 years before the 1945 birth year of Lyle Eugene Dunbar (D-82), or the 1645 to 1675 time period assuming the nominal 30 years per generation.

This prediction of 9 to 10 generations and the years 1645 to 1675 for the most likely TMRCA is generally consistent with the assigned youngest (Age Group 5) haplogroup R-FT381714 for D-332, who has known common ancestors with D-273; and the next-to-youngest (Age Group 4) haplogroup R-BY68646 assigned to Lyle Eugene Dunbar (D-82). However, the prediction of 9 to 10 generations for the common ancestor of D-273 and Lyle Eugene Dunbar (D-82) is inconsistent with the 8 to 9 generations predicted for D-318 based on his Big Y test results. Assuming the ancestry information is correct, the author has assumed the haplogroup R-FT381714 based on the Big Y test results for D-318 and D-332 is most likely. The FTDNATiP predictions suggest that the earliest possible common ancestor could be the 10<sup>th</sup>-generation unknown ancestor of Lyle Eugene Dunbar (D-82), who is called “10<sup>th</sup>-UnKnown (bc.1643)” and the great-grandfather of John Dunbar of Philadelphia County (b.1733,d.1778).

**D-260** is a matching testee with Lyle Eugene Dunbar (D-82) based on his 111-marker test result which shows a GD 3, or 3 mutations or differences in their Y-DNA STR test results, as shown in **Illustration 3b**, and he is assigned to the older M-269 haplogroup because he didn't complete the Big Y test. However, his ancestry information indicates a close-relationship to D-271, who is assigned to the fifth younger (Age Group 5) haplogroup R-BY121797. The ancestors of D-260 are based on information provided to the author by Steve Arthur, who manages the account and whose wife is a cousin of D-271, as previously described. Steve Arthur has researched the Dunbar L2 branch ancestry of D-260 [Ref. 1]. The EKA of D-260 was his 5<sup>th</sup>-generation EKA, Robert Dunbar Sr (bc.1760,da.1839), who was born about 1760 in Chester County, Pennsylvania; he married in 1790 to Hannah Maxwell, who was the youngest daughter of John and Margaret Maxwell; they lived in Gap Mills, Monroe County, Virginia (now West Virginia); he died after 1839, and he was also the EKA of D-271, D-318, and D-332. His Dunbar L2 branch male line ancestors then follow a parallel branch to that of D-271, D-318, and D-332 with successive ancestors as follows: his 2<sup>nd</sup> son, William Dunbar (b.1792,d.1875), who married Nancy Jarvis; their son, William Thomas Dunbar (b.1821,d.1892), who married Rebecca C. Brown; their son, Anderson Brown Dunbar (b.1859,d.1928), who married Mary Susan Riner; their son, Wilbur Arthur Dunbar (b.1883,d.1954), who married Geneva Alice Prather; and their son is D-260 who was still living in 2005.

The FTDNATiP calculator was used with a “TMRCA after Gen” of 7 because there is no common ancestor with D-260 before 7 generations in the genealogy information of Lyle Eugene Dunbar (D-82). FTDNATiP predicts a cumulative probability of 43%, 68%, and 82% for TMRCA at 7, 8, and 9 generations, respectively, as shown in **Illustration 5b**, with 8 to 9 generations selected as the range of probabilities of the most likely TMRCA based on the calibration analyses presented in the earlier section. This indicates the most likely TMRCA of about 240 to 270 years before the 1945 birth year of Lyle Eugene Dunbar (D-82), or the 1675 to 1705 time period assuming the nominal 30 years per generation.

This prediction of 8 to 9 generations and the years 1675 to 1705 for the most likely TMRCA is generally consistent with the youngest (Age Group 5) haplogroup R-BY121797 assigned to D-271,

who has known common ancestors with D-260 and the next-to-youngest (Age Group 4) haplogroup R-BY68646 assigned to Lyle Eugene Dunbar (D-82). The FTDNATiP predictions suggest that the earliest possible common ancestor could be the 10<sup>th</sup>-generation unknown ancestor of Lyle Eugene Dunbar (D-82), who is called “10<sup>th</sup>-UnKnown (bc.1643)” and the great-grandfather of John Dunbar of Philadelphia County (b.1733,d.1778). However, the Big Y-700 test results indicate that the TMRCA is further back in time as discussed later.

**Illustration 7** shows the fifth younger (Age Group 5) Dunbar L2 sub-branch family tree for haplogroups R-BY121797 and R-FT381714 based on Y-DNA and Big Y Test results, known ancestry information, and FTDNATiP predictions. The known ancestry information for each Y-DNA matching testee was used to construct the family tree back in time to the EKA listed as Robert Dunbar Sr (bc.1760,da.1839), who was born about 1760 in Chester County, Pennsylvania. Then the earlier ancestors are inserted in the family tree listing their names as “UnKnown (bc.XXXX)” using their estimated birth year “XXXX” based on an assumed number of years between each unknown generation assuming an average of 30 years per generation. These unknown ancestors are used as placeholders in this L2 sub-branch family tree to define common ancestors and TMRCA’s of the various Dunbar L2 sub-branch haplogroups. The Big Y test results identified the common Terminal SNPs as BY121797, FT239304, FT238845, and FT381714 for haplogroup R-BY121797. These four haplotypes suggest a possible four generations between the EKA, Robert Dunbar Sr (bc.1760,da.1839), and a common ancestor with the author’s L2 sub-branch haplogroup R-BY68646, which would be the “10<sup>th</sup>-Unknown (bc.1643)” with a TMRCA of about 1643.

### **Age Group 3 FTDNATiP Predictions**

The next predictions of common ancestors are focused on the third younger (Age Group 3) L2 sub-branch associated with haplogroup R-BY18214 assigned to D-227, D-168, and D-303 based on their Big Y test results which identified their common Terminal SNPs as BY18214 and BY140967. The known ancestry of these matching testees identifies their EKA as Daniel Charles Dunbar (bc.1765), who was born about 1765 in County Tyrone, Ireland. The FTDNATiP calculator with the nominal values of “68% cumulative probability” and “30-year average per generation” was first used to predict the probabilities for the TMRCA between each matching testee and the author listed as Lyle Eugene Dunbar (D-82) in each generation after the author’s birth year of 1945. **Illustrations 3 and 5a** show the Y-DNA test results for Lyle Eugene Dunbar (D-82) and the other L2 branch matching testees as described in the following pages.

**D-227** is a Big Y matching testee with Lyle Eugene Dunbar (D-82) with a GD 8, or 8 mutations or differences in their Y-111 STR markers, and 7 of 759 mutations or differences in their Big Y-700 markers as shown in **Illustrations 3 and 5a**, and he is assigned to haplogroup R-BY18214 which is the third younger (Age Group 3) of the haplogroups assigned to the Big Y matching testees. The ancestors of D-227 are based on the information provided to the author by Rosalind “Ros” Ludwig, who researched the Dunbar Lineage 2 branch ancestors of her cousin, D-227, in Australia and County Tyrone, Ireland [Ref. 10]. The EKA of D-227 was Daniel Charles Dunbar (bc.1765), who was born about 1765 in County Tyrone, Ireland, and married Annabella Collingwood. His successive ancestors were Charles Dunbar (b.1792,d.1835), who lived on a farm in the Grange Townland near Newtownstewart, Ardstraw Parish, County Tyrone, Ireland; Samuel Dunbar (b.1818,d.1864), who migrated from County Tyrone, Ireland, to Australia in 1840; Randolph Collingwood Dunbar (b.1863,d.1891), Edward Auburn Dunbar (b.1863,d.1945), and Randolph Edward Dunbar (b.1909,d.1989), who was the father of D-227 and uncle of Ros Ludwig.

The FTDNATiP calculator was used with a “TMRCA after Gen” of 7 because there is no common ancestor of D-227 for 7 generations with Lyle Eugene Dunbar (D-82) based on known ancestry information. The FTDNATiP calculator predicts a cumulative probability for the TMRCA of D-227 and Lyle Eugene Dunbar (D-82) of 54%, 65%, and 74% at 10, 11, and 12 generations, respectively, as shown in **Illustration 3a**, with 11 to 12 generations at 65.2% and 74.3% as the range of probabilities of the most likely TMRCA based on the calibration analyses presented in a previous section. This indicates the most likely TMRCA of about 330 to 360 years before the 1945 birth year of Lyle Eugene Dunbar (D-82), or the 1585 to 1615 time period assuming the nominal 30 years per generation.

This prediction of 11 to 12 generations and the years 1585 to 1615 for the most likely TMRCA is consistent with the older (Age Group 3) haplogroup R-BY18214 assigned to D-227 and the younger (Age Group 4) haplogroup R-BY68646 assigned to Lyle Eugene Dunbar (D-82). However it is not consistent with the 8 to 9 generations predicted for the older (Age Group 2) haplogroup R-BY20513 assigned to D-39 and D-327, as described later in this section of this paper. One possible explanation could be the 2 extra generations in the branch of D-327 compared to the other branches which could have resulted in additional mutations and a more distant prediction of the TMRCA. The ancestry information for D-227 indicates his 6<sup>th</sup>-generation EKA was Daniel Charles Dunbar (bc.1765), who was born about 1765 in County Tyrone, Ireland. The EKA of Lyle Eugene Dunbar (D-82) was his 7<sup>th</sup>-generation EKA, John Dunbar of Philadelphia County (b.1733,d.1778), who was born in 1733 in County Tyrone, Ireland, and arrived in Philadelphia in 1746. The FTDNATiP prediction and known ancestry information suggests that the common ancestor of the L2 sub-branches of D-227 and Lyle Eugene Dunbar (D-82) may have lived in County Tyrone, Ireland, in the late-1600’s or possibly in southwest Scotland much earlier in the late-1500’s.

**D-168** is a Big Y matching testee with Lyle Eugene Dunbar (D-82) with a GD 4, or 4 mutations or differences in their Y-111 STR markers, and 3 mutations or differences in their Big Y markers as shown in **Illustrations 3 and 5a**, and he is assigned to haplogroup R-BY18214 which is the third younger (Age Group 3) of the haplogroups assigned to the Big Y matching testees. The ancestors of D-168 are based on the information provided to the author by Gail Clariss, who researched the Dunbar Lineage 2 branch ancestors of her brother, D-168, who lives in Australia [Ref. 13]. The EKA of D-168 was Charles Dunbar, who was listed as a witness to his son’s marriage in Manchester, Lancashire, England, in 1847. His successive ancestors were Andrew Dunbar who was married to Ann Leech on December 12, 1847, in Manchester, Lancashire, England; and Robert Dunbar (b.1870,d.1934), who married Mary McArthur Clark and died in Penola, South Australia. His son, D-168, lives in Australia. The Gail Dunbar family tree shown in ancestry.com assumes the EKA named Charles Dunbar was actually Charles Dunbar (b.1792,d.1885), who lived in County Tyrone, Ireland, and his earlier ancestor was Daniel Charles Dunbar (bc.1765), who was born about 1765 in County Tyrone, Ireland, and married Annabella Collingwood. This is the same EKA listed for D-227 in County Tyrone, Ireland.

The FTDNATiP calculator was used with a “TMRCA after Gen” of 7 because there is no common ancestor of D-168 for 7 generations with Lyle Eugene Dunbar (D-82) based on known ancestry information. The FTDNATiP calculator predicts a cumulative probability for the TMRCA of D-168 and Lyle Eugene Dunbar (D-82) of 50%, 60%, and 68% at 10, 11, and 12 generations, respectively, shown in **Illustration 5a**, with 11 to 12 generations at 60% to 68% as the most likely range of the TMRCA from the previously described calibration analyses. This indicates the TMRCA

at about 330 to 360 years before the 1945 birth year of Lyle Eugene Dunbar (D-82), or the 1585 to 1615 time period assuming the nominal 30 years per generation.

This prediction of 11 to 12 generations and the years 1585 to 1615 for the most likely TMRCA is consistent with the older (Age Group 3) haplogroup R-BY18214 assigned to D-168 and the younger (Age Group 4) haplogroup R-BY68646 assigned to Lyle Eugene Dunbar (D-82). The 11 to 12 generations prediction is also consistent with the 11 to 12 generations prediction for D-227 who is assigned to the same haplogroup R-BY18214. However these predictions are not consistent with the 8 to 9 generations predicted for the older (Age Group 2) haplogroup R-BY20513 assigned to D-39 and D-327, as described later in this section of the paper. As stated previously, the explanation could be that there are 2 extra generations in the branches of D-168 as well as D-227 compared to the other branches which could have resulted in additional mutations and a more distant prediction of the TMRCA.

**D-303** is a Big Y matching testee with Lyle Eugene Dunbar (D-82) with a GD 3, or 3 mutations or differences in their Y-111 STR markers, and 10 of 607 mutations or differences in their Big Y-700 markers as shown in **Illustrations 3 and 5a**, and he is assigned to haplogroup R-BY18214 which is the third younger (Age Group 3) of the haplogroups assigned to the Big Y matching testees. The ancestors of D-303 are based on information provided to the author by Rosalind “Ros” Ludwig, who researched the Dunbar Lineage 2 branch ancestors of her cousin, D-227, in Australia, as well as her distant cousin, D-303, in County Tyrone, Ireland [Ref. 10]. The EKA of D-303 was Daniel Charles Dunbar (bc.1765), who was born about 1765 in County Tyrone, Ireland, and married Annabella Collingwood, and this is also the common EKA of D-227 and D-168. The successive ancestors of D-303 included: the first son, John Jeremiah Dunbar (bc.1786) who was born in about 1786; his son, Daniel Dunbar (bc.1812,d.1887), who was born about 1812, married Rebecca Crawford, and died in 1887 in the Grange Townland of Ardstraw Parish, County Tyrone; his first son, John Jeremiah Dunbar (b.1877,d.1958); and his son is D-303. All of these ancestors lived in the same Grange Townland area of Ardstraw Parish in County Tyrone, Ireland. In 2017, D-303 was still living on the ancestral farm in the Grange Townland near Newtownstewart in Ardstraw Parish in the northwest of County Tyrone in Northern Ireland when Ros Ludwig visited and obtained this ancestry information.

The FTDNATiP calculator was used with a “TMRCA after Gen” of 7 because there is no common ancestor of D-303 for 7 generations with Lyle Eugene Dunbar (D-82) based on known ancestry information. The FTDNATiP calculator predicts a cumulative probability for the TMRCA of D-303 and Lyle Eugene Dunbar (D-82) of 41%, 66%, and 81% at 7, 8, and 9 generations, respectively, as shown in **Illustration 5a**, with 8 to 9 generations at 66% and 81% as the range of probabilities of the most likely TMRCA based on the calibration analyses presented in the earlier section. This indicates the most likely TMRCA of about 240 to 270 years before the 1945 birth year of Lyle Eugene Dunbar (D-82), or the 1675 to 1705 time period assuming the nominal 30 years per generation.

This prediction of 8 to 9 generations and the years 1675 to 1705 for the most likely TMRCA is consistent with the older (Age Group 3) haplogroup R-BY18214 assigned to D-303 and the younger (Age Group 4) haplogroup R-BY68646 assigned to Lyle Eugene Dunbar (D-82). However, this 8 to 9 generation prediction is inconsistent with the 10 to 11 generation prediction for D-227 and D-168 who are both assigned to the same haplogroup R-BY18214 as D-303. This inconsistency could possibly be explained by the two extra generations and associated possible added mutations for D-227 and D-168, who are 6<sup>th</sup>-generation descendants of their common ancestor, Daniel Charles Dunbar (bc.1765), compared to D-303, who is a 4<sup>th</sup>-generation descendant.

The FTDNATiP calculator predictions for D-227, D-168, and D-303 suggest the common ancestor of their L2 sub-branch haplogroup R-BY18214 with the L2 sub-branch of Lyle Eugene Dunbar (D-82) is somewhere in the 8<sup>th</sup> to 12<sup>th</sup> generations. Their ancestry information with common EKA of Daniel Charles Dunbar (bc.1765), who was born about 1765 in County Tyrone, Ireland, suggests that the common ancestor of the their L2 sub-branch and the author's L2 sub-branch could have been in County Tyrone, Ireland.

**Illustration 8** shows the third younger (Age Group 3) Dunbar L2 sub-branch family tree for haplogroup R-BY18214 based on Big Y Test results, known ancestry information, and FTDNATiP predictions. The known ancestry information for each Y-DNA matching testee was used to construct the family tree back in time to the EKA listed as Daniel Charles Dunbar (bc.1765), who was born about 1765 in County Tyrone, Ireland. Then the earlier ancestors are inserted in the family tree listing their names as "UnKnown (bc.XXXX)" using their estimated birth year "XXXX" based on an assumed number of years between each unknown generation assuming an average of 30 years per generation. These unknown ancestors are used as placeholders in this L2 sub-branch family tree to define common ancestors and TMRCA's of the various Dunbar L2 sub-branch haplogroups. The Big Y test results for haplogroup R-BY18214 identified the common Terminal SNPs as BY18214 and 140967. These two haplotypes suggest at for two to five generations between the EKA, Daniel Charles Dunbar (bc.1765), and a common ancestor with the author's L2 sub-branch haplogroup R-BY68646. The FTDNATiP calculator predictions suggest about five generations. The common ancestor is predicted to be the "12<sup>th</sup>-Unknown (bc.1583)" with a TMRCA of about 1583. This year predates the formation of the Ulster Plantation and migrations of Ulster Scots from Scotland to Ireland. In this case, the common ancestor would have been born in Scotland and the descendant ancestors in the two L2 sub-branches would have separately migrated to County Tyrone, Ireland, by the early-1700's.

### **Age Group 2 FTDNATiP Predictions**

The next predictions of common ancestors are focused on the second younger (Age Group 2) L2 sub-branch associated with haplogroup R-BY20513 assigned to D-39, D-327, and D-6 based on their Big Y test results which identified their common Terminal SNPs as BY20513. The FTDNATiP calculator with the nominal values of "68% cumulative probability" and "30-year average per generation" was first used to predict the probabilities for the TMRCA between each matching testee and the author listed as Lyle Eugene Dunbar (D-82) in each generation after the author's birth year of 1945. **Illustrations 3 and 5a** shows the Y-DNA test results for Lyle Eugene Dunbar (D-82) and the other L2 branch matching testees as described in the following pages.

**D-39** is a Big Y matching testee with Lyle Eugene Dunbar (D-82) with a GD 5, or 5 mutations or differences in their Y-111 STR markers, and 4 of 624 mutations or differences in their Big Y-700 markers as shown in **Illustrations 3 and 5a**. D-39 is assigned to haplogroup R-BY20513 which is the second younger (Age Group 2) of the haplogroups assigned to the Big Y matching testees. The ancestors of D-39 are based on the information provided to the author by D-39 for his Dunbar Lineage 2 branch [Ref. 7]. The EKA of D-39 was William Dunbar (b.1714), who was born in 1714 in County Antrim, Ireland; he married Catherine Sarah Barclay, who was born April 24, 1718, in County Tyrone, Ireland, before 1735; they migrated to America by 1735; and they lived at Meeting House Springs located on the Conedoquinet River in Cumberland County, Pennsylvania, where their 2 daughters, Jane and Elizabeth, and 1<sup>st</sup> son, John Dunbar (b.1737,d.1810) were born by 1737; and they had a total of 10 children. The next ancestor was their 2<sup>nd</sup> son, Thomas Dunbar (b.1741,dc.1824), who was born in

Lancaster County, Pennsylvania, in 1741; he married Ann Keys (b.1750,d.1835) in 1784; they initially settled in Virginia and then moved to Tennessee in 1784. Their 1<sup>st</sup> son, William Dunbar (b.1776,d.1852), was born July 31, 1776, in Virginia; and moved to Tennessee with his parents in 1784; and he married Elizabeth Hall (b.1778,d.1847) in 1799. Their son, James L. Dunbar (b.1800,d.1878), was born January 6, 1800, in Stewart County, Tennessee, and married Sarah Rushing (b.1804); his son, Walter Drene Dunbar (b.1833,d.1899), who married Sarah Zane Lewis (b.1843,d.1917) in 1859; his son William T. Dunbar Sr (b.1870,d.1920) who married Annie Spears (b.1881,d.1965) in 1906; his son, William Taylor Jr (b.1909,d.1965); and his son is D-39.

The FTDNATiP calculator was used with a “TMRCA after Gen” of 7 because there is no common ancestor of D-39 for 7 generations with Lyle Eugene Dunbar (D-82) based on known ancestry information. The FTDNATiP calculator predicts a cumulative probability of 66%, 81%, and 89% at 8, 9, and 10 generations, respectively, with 8 to 9 generations at 66% to 81% as the range of probabilities of the most likely TMRCA based on the calibration analyses presented in the previous section as shown in **Illustration 3a**. This indicates the most likely TMRCA of about 240 to 270 years before the 1945 birth year of Lyle Eugene Dunbar (D-82), or the 1675 to 1705 time period assuming the nominal 30 years per generation.

This prediction of 8 to 9 generations and the years 1675 to 1705 for the most likely TMRCA is consistent with the older (Age Group 2) haplogroup R-BY20513 assigned to D-39, the younger (Age Group 4) haplogroup R-BY68646 assigned to Lyle Eugene Dunbar (D-82), and the older (Age Group 1) haplogroup R-BY20512 assigned to D-6 and haplogroup R-FT168149 assigned to D-31 and D-13. The FTDNATiP calculator predicts the common ancestor of the Dunbar L2 branch of D-39 and Lyle Eugene Dunbar (D-82) is about 1 to 2 generations earlier than the author’s EKA, John Dunbar of Philadelphia County (b.1733,d.1778), who was born in County Tyrone, Ireland, in 1733 and arrived in Pennsylvania in 1746. The EKA of D-39 was William Dunbar (b.1714) who was born in County Antrim, Ireland, and married in about 1735 in County Tyrone, Ireland, before migrating to America before 1735. This known ancestry information suggests that the common ancestor of the L2 branches of D-39 and Lyle Eugene Dunbar (D-82) may have been located in County Antrim, Ireland, in the early-1700’s.

**D-327** is a Big Y matching testee with Lyle Eugene Dunbar (D-82) with a GD 2, or 2 mutations or differences in their Y-111 STR markers, and 4 of 569 mutations or differences in their Big Y-700 markers as shown in **Illustrations 3 and 5a**. D-327 is assigned to haplogroup R-BY20513 which is the second younger (Age Group 2) of the haplogroups assigned to the Big Y matching testees. The ancestors of D-327 are based on the information provided by Matthew Gilbert, who is the Dunbar Surname DNA Project account manager [Ref. 15], and also additional information obtained by the author from the “Roots-Boots” genealogy study [Ref. 16]. The patriarchs page and Matthew Gilbert listed the EKA of D-327 as John Dunbar (d.1875), and his widow, Mary Dunbar (D.1876) in Letterbrat Townland, Glencoppogagh Parish, County Tyrone, Ireland; their son, David Dunbar (bc.1842,d.1907), who was born about 1842, married Matilda Jane Smyth, and died in 1907 in Letterbrat Townland in County Tyrone, Ireland; their son, James Dunbar (b.1876) in Letterbrat Townland in County Tyrone, Ireland, who married Elizabeth Mary Arbuckle; and their son, David James Dunbar (bc.1919), who was born in about 1919 in Letterbrat Townland in County Tyrone, Ireland, and married Sarah Campbell; Willie John Dunbar; and his son, D-327, who currently resides in Ireland. The extensive Roots-Boots genealogy study lists similar genealogy information for a Dunbar branch in County Tyrone, which the

author calls “Dunbars of Letterbrat Townland in Upper Bodoney Parish”, and the EKA of this branch is listed as Matthew Dunbar (bb.1755,da.1796) in Letterbrat Townland, Upper Bodoney Parish. The successive ancestors correlating with the known ancestors of D-327 are listed as: John Dunbar (bc.1770) in Letterbrat Townland and then Glencoppogagh Townland in Upper Bodoney Parish; John Dunbar (bc.1805,db.1875) in Letterbrat Townland, Upper Bodoney Parish and then Newtownstewart in adjacent Ardstraw Parish; David Dunbar (b.1840,d.1907) in Glencoppogagh and Letterbrat Townland, Upper Bodoney Parish, married Mathilda Jane Smith; and James Dunbar (b.1877) in Letterbrat Townland, Upper Bodoney Parish. This James Dunbar (b.1877) appears to be the great-grandfather of D-327.

The FTDNATiP calculator was used with a “TMRCA after Gen” of 7 because there is no common ancestor with D-327 before 7 generations in the genealogy information of Lyle Eugene Dunbar (D-82). FTDNATiP predicts a cumulative probability of 53%, 78%, and 90% for TMRCA at 7, 8, and 9 generations, respectively, with 8 to 9 generations selected as the range of probabilities of the most likely TMRCA based on the calibration analyses presented in the earlier section as shown in **Illustration 5a**. This indicates the TMRCA of about 240 to 290 years before the 1945 birth year of Lyle Eugene Dunbar (D-82), or the 1675 to 1705 time period assuming the nominal 30 years per generation.

This prediction of 8 to 9 generations and the years 1675 to 1705 for the most likely TMRCA is consistent with the older (Age Group 2) haplogroup R-BY20513 assigned to D-327, the younger (Age Group 4) haplogroup R-BY68646 assigned to Lyle Eugene Dunbar (D-82), and the older (Age Group 1) haplogroup R-BY20512 assigned to D-6 and haplogroup R-FT168149 assigned to D-31 and Matthew D-13. This prediction is also consistent with the prediction of 8 to 9 generations for D-39 who is also assigned to the same R-BY20513 haplogroup. The FTDNATiP calculator predicts the common ancestor of the L2 sub-branches of D-327 and Lyle Eugene Dunbar (D-82) is about 1 to 2 generations earlier than the author’s EKA, John Dunbar of Philadelphia County (b.1733,d.1778), who was born in County Tyrone, Ireland, in 1733 and arrived in Pennsylvania in 1746. The EKA of D-327 may have been Matthew Dunbar (bb.1755,da.1796) in Letterbrat Townland, Upper Bodoney Parish, County Tyrone, Ireland. The FTDNATiP prediction and known ancestry information suggests that the common ancestor of the L2 branches of D-327 and Lyle Eugene Dunbar (D-82) may have been located in County Tyrone, Ireland, in the early-1700’s.

**D-6** is a Big Y matching testee with Lyle Eugene Dunbar (D-82) with a GD 4, or 4 mutations or differences in their Y-111 STR markers, and 6 of 606 mutations or differences in their Big Y-700 markers as shown in **Illustrations 3 and 5a**. D-6 is assigned to haplogroup R-BY20513 which is the second younger (Age Group 2) of the haplogroups assigned to the Big Y matching testees. The ancestors of D-6 are based on information provided to the author by D-39, whose branch has common ancestors, and Tom Lawhon, who has documented the history of the branch of D-6 [Ref. 7 and 12]. The EKA of D-6 was William Dunbar (b.1714), who was born in 1714 in County Antrim, Ireland; he married before 1745 to Catherine Sarah Barclay, who was born April 24, 1718, in County Tyrone, Ireland; they migrated to America by 1735; and they lived at Meeting House Springs located on the Conedoquinet River in Cumberland County, Pennsylvania, where their 2 daughters, Jane and Elizabeth, and 1<sup>st</sup> son, John Dunbar (b.1737,d.1810) were born by 1737, and they had a total of 10 children. Successive ancestors included: the 2<sup>nd</sup> son, Thomas Dunbar (b.1741,d.1823), who was born in Lancaster County, Pennsylvania, in 1741, he married Ann Keys (b.1750,d.1835) in 1784, they initially

settled in Virginia and then moved to Tennessee in 1784; his 2<sup>nd</sup> son, James Dunbar (b.1778), who was born November 22, 1778, in Pennsylvania, and he is the brother of the 1<sup>st</sup> son, William Dunbar (b.1776,d.1852), in the parallel branch of D-39; William Dunbar Jr (b.1819,d.1855), who was born January 1, 1819, in Tennessee where he married in 1847 to Nancy Rowlett; and they migrated to Bastrop, Texas; his 1<sup>st</sup> son, John Samuel Dunbar (b.1848,d.1933); his 3<sup>rd</sup> son, James Virgil Dunbar (b.1874,d.1944); his 3<sup>rd</sup> son, Virgil Preston Dunbar (b.1905,d.1956); his son, Mr. Dunbar; and his son is D-6.

The FTDNATiP calculator was used with a “TMRCA after Gen” of 7 because there is no common ancestor of D-6 for 7 generations with Lyle Eugene Dunbar (D-82) based on known ancestry information. The FTDNATiP calculator predicts a cumulative probability of 51%, 67%, and 77% at 8, 9, and 10 generations, respectively, as shown in **Illustration 5a**, with 9 to 10 generations at 67% to 78% as the range of probabilities of the most likely TMRCA based on the calibration analyses presented in the earlier section. This indicates the most likely TMRCA of about 270 to 300 years before the 1945 birth year of Lyle Eugene Dunbar (D-82), or the 1645 to 1675 time period assuming the nominal 30 years per generation.

This prediction of 9 to 10 generations and the years 1645 to 1675 for the most likely TMRCA is consistent with the prediction for the next-to-oldest (Age Group 2) haplogroup R-BY20513 assigned to D-39, who also has known common ancestors with D-6; and the next-to-youngest (Age Group 4) haplogroup R-BY68646 assigned to Lyle Eugene Dunbar (D-82). The FTDNATiP calculator predicts the common ancestor of the L2 sub-branches of D-6 and Lyle Eugene Dunbar (D-82) is about 2 to 3 generations earlier than John Dunbar of Philadelphia County (b.1733,d.1778), who was born in County Tyrone, Ireland, in 1733 and arrived in Philadelphia in 1746 as a young man, and who was the 7<sup>th</sup>-generation EKA of Lyle Eugene Dunbar (D-82). The EKA of D-6 was William Dunbar (b.1714), who was born in County Antrim, Ireland, and married in about 1735 in County Tyrone, Ireland, before migrating to America before 1735. These results suggest the common ancestor of D-6 and Lyle Eugene Dunbar (D-82) may have been in County Antrim, Ireland, in the early-1700’s.

**Illustration 9** shows the second oldest (Age Group 2) Dunbar L2 sub-branch family tree for haplogroup R-BY20513 based on Big Y Test results, known ancestry information, and the FTDNATiP calculator predictions for D-39, D-327, and D-6. The known ancestry information for each Y-DNA matching testee was used to construct the family tree back in time to the EKA of each L2 sub-branch in haplogroup R-BY20513 who were located in County Antrim and County Tyrone, Ireland. Then the earlier ancestors of these L2 sub-branches were inserted in the family tree listing their names as “UnKnown (bc.XXXX)” using their estimated birth year “XXXX” based on an assumed number of years between each unknown generation assuming an average of 30 years per generation. These unknown ancestors were used as placeholders in these L2 sub-branches to define common ancestors and TMRCA’s with the other L2 sub-branch haplogroups. The Big Y test results for haplogroup R-BY20513 identified the common shared Terminal SNP as BY20513, and the most likely common ancestor of the other four haplogroups as the “12<sup>th</sup>-Unknown (bc.1583)” of the L2-sub-branch of Lyle Eugene Dunbar (D-82). The FTDNATiP calculator predictions using the STR marker test data suggested a much earlier common ancestor somewhere in the 8<sup>th</sup> to 10<sup>th</sup> generations of the L2 sub-branch of Lyle Eugene Dunbar (D-82). However, the Big Y test results are considered more accurate and the common ancestor and TMRCA is predicted to be the “12<sup>th</sup>-Unknown (bc.1583)” born about 1583. Since this year predates the formation of the Ulster Plantation and migrations of Ulster Scots

from Scotland to Ireland, the common ancestor was most likely born in Scotland and his descendants most likely migrated to County Tyrone and County Antrim in Ireland in the 1600's to 1700's time period.

### **Age Group 1 FTDNATiP Predictions**

The final predictions of common ancestors of the L2 sub-branches are focused on the oldest (Age Group 1) L2 sub-branch associated with haplogroup R-BY20512 assigned to D-6, and haplogroup R-FT168149 assigned to D-31 and D-13 based on their Big Y test results which identified their common Terminal SNPs as BY20512, BY20514, FT145692, FT144894, and FT258160. The known ancestry of these matching testees identifies their EKA's who lived in County Antrim and County Tyrone in Ireland in the late-1700's and in Scotland in the early-1600's. The FTDNATiP calculator with the nominal values of "68% cumulative probability" and "30-year average per generation" was first used to predict the probabilities for the TMRCA between each matching testee and the author listed as Lyle Eugene Dunbar (D-82) in each generation after the author's birth year of 1945. **Illustrations 3 and 5a** show the Y-DNA test results for Lyle Eugene Dunbar (D-82) and the other L2 branch matching testees as described in the following pages.

**D-31** is a Big Y matching testee with Lyle Eugene Dunbar (D-82) with a GD 8, or 8 mutations or differences in their Y-111 STR markers, and 8 of 614 mutations or differences in their Big Y-700 markers as shown in **Illustrations 3 and 5a**. D-31 is assigned to haplogroup R-FT168149 which is a younger sub-branch of haplogroup R-BY20512, and these haplogroups are both included in the oldest Age Group 1 of the haplogroups assigned to the Big Y matching testees. The ancestors of D-31 are based on information provided to the author by the manager of this account, Cheryl Dunbar Kahlke, who is a Dunbar L2 branch descendant and aunt of D-31 [Ref. 9]. The EKA of D-31 was Thomas Henry Dunbar (bc.1754,dc.1850) about whom little is known except that he possibly married a woman with surname Wallace and he died at age 96 in about 1850 in County Antrim, Ireland. The next ancestor of his male-line was Thomas Dunbar (b.1784,d.1859), who was born in 1784 in Rasharkin, County Antrim, Ireland; he is referred to in legal documents as "T.H." indicating his name was probably "Thomas Henry" like his son; he married Jane Hunter and they migrated to Canada in 1829; and he died September 5, 1859, in Dunbar, Otoe County, Nebraska. The next ancestor was his son, Thomas Henry Dunbar (b.1833,d.1890), who was born on March 21, 1833, in Halton County, Ontario, Canada; he married on October 19, 1858, to Sarah Walton; and he died on April 9, 1890, in Downie Township, Perth County, Ontario, Canada. The next ancestor was his son, Thomas Dunbar (b.1859,d.1945), who was born on July 29, 1859 in Dunbar, Otoe County, Nebraska; he married on November 20, 1899, to Mary Anne Matilda Hunter in Clanwilliam, Manitoba, Canada; and he died on August 31, 1945 in McCreary, Manitoba, Canada. The next successive ancestors were his son, James Dunbar (b.1893,d.1951), who was born in Bethany, Manitoba, Canada, and died in New York City, New York; his son, who was the father of Cheryl Dunbar Kahlke; his son, who was a brother of Cheryl Dunbar Kahlke; and his son is D-31.

The FTDNATiP calculator was used with a "TMRCA after Gen" of 7 because there is no common ancestor of D-31 for 7 generations with Lyle Eugene Dunbar (D-82) based on known ancestry information. FTDNATiP predicts a cumulative probability of 56%, 69%, and 78% for the TMRCA at 9, 10, and 11 generations, respectively, with 10 to 11 generations at 69% and 78% as the range of probabilities of the TMRCA based on the calibration analyses, as shown in **Illustration 5a**. This

indicates the most likely TMRCA of about 300 to 330 years before the 1945 birth year of Lyle Eugene Dunbar (D-82), or the 1615 to 1645 time period assuming the nominal 30-years per generation.

This prediction of 10 to 11 generations and the years 1615 to 1645 for the most likely TMRCA is consistent with the oldest Age Group 1 and the haplogroup R-FT168149 assigned to D-31 as compared to the younger Age Group 4 of the haplogroup R-BY68646 assigned to Lyle Eugene Dunbar (D-82). The ancestry information for D-31 indicates his 7<sup>th</sup>-generation EKA was Thomas Henry Dunbar (bc.1754,dc.1850) who died in about 1850 at the age of 96 in County Antrim, Ireland, where his son, Thomas Dunbar (b.1784,d.1859), was born in 1784, and he migrated to Canada in 1829. County Antrim is the next county east of County Tyrone where John Dunbar of Philadelphia County (b.1733,d.1778), who is the EKA and 7<sup>th</sup>-generation ancestor of Lyle Eugene Dunbar (D-82) who was born in 1733 and migrated to Pennsylvania in 1746. The L2 sub-branch of D-31 probably migrated from Scotland to County Antrim, Ireland, in the late-1600's to early-1700's before migrating to Canada in 1829. The L2 sub-branch of Lyle Eugene Dunbar (D-82) probably migrated to County Tyrone from either County Antrim or directly from southwest Scotland before migrating to Pennsylvania in 1746. These results suggest that the common ancestor of the L2 sub-branches of D-31 and Lyle Eugene Dunbar (D-82) may have been located in County Antrim, Ireland, in the late-1600's to early-1700's or in southwest Scotland prior to the 1600's.

**D-13** is a Big Y matching testee with Lyle Eugene Dunbar (D-82) with a GD 4, or 4 mutations or differences in their Y-111 STR markers, and 7 of 586 mutations or differences in their Big Y-700 markers as shown in **Illustrations 3 and 5a**. D-13 is assigned to haplogroup R-FT168149 which is a younger sub-branch of the oldest Age Group 1 of the haplogroups assigned to the Big Y matching testees. The ancestors of D-13 are based on the information on the Dunbar Surname DNA Project website patriarchs page with additional information assembled by the author from the "Roots-Boots" genealogy study [Ref. 16]. The patriarchs page shows the EKA of D-13 was William Dunbar, who married a wife with the first name Ann, but whose actual birth and death years are unknown; their son, Richard Dunbar (b.1844,d.1898), who was born 19 Apr 1844 in Bockets Townland, Killeeshil Parish, County Tyrone, Ireland, who married Mary Galway, and he died 21 Apr 1898 in Hubbardston, Massachusetts; their son, Richard Dunbar (b.1878,d.1954), who was born 25 Oct 1878 in Hubbardston, Massachusetts, who married Maude Caroline Barnes, and he died 11 Feb 1954 in Worcester, Massachusetts; their son, Ralph Waldo Dunbar (b.1914,d.1975), who was born 12 Dec 1914 in Worcester, Massachusetts, who married Virginia Marshall, and he died 8 Mar 1975 in Worcester, Massachusetts; and their son is D-13. The extensive Roots-Boots genealogy study lists similar ancestry information for a Dunbar branch with an EKA of "Richard Dunbar (b.1844,d.1898)" except it shows a brother, William Dunbar (bc.1835), and an uncle, William Dunbar (bb.1809); but lists his father as follows: Thomas Dunbar (bb.1809), married an unknown woman, and resided in 1829 in Ballygawley, Errigal Keerogue Parish, County Tyrone. His father is listed as: Richard Dunbar (bc.1775-1785), who married an unknown woman, and resided in 1829 in Lurgacullion Townland in Killeeshil Parish, County Tyrone. This Dunbar family is referred to by the author as the "Dunbars of Lurgacullion Townland in Killeeshil Parish" and some of its members are listed in the database "Griffith's Valuation" with the surname miss-spelled as "Dunbane". The father of Richard Dunbar (bc.1775-1785) is unknown; his sister is assumed to be Isabella Dunbar (bc.1770), who married Thomas Irwin (bc.1770) in about 1795; their son was George Irwin whose daughter, Annie Irwin, married to a Dunbar [Ref. 16]. If this ancestry information can be confirmed for D-13, then his EKA was probably Richard Dunbar (bc.1775) living in 1829 in Lurgacullion Townland, Killeeshil Parish, County Tyrone.

The FTDNATiP calculator was used with a “TMRCA after Gen” of 7 because there is no common ancestor with D-13 before 7 generations in the genealogy information of Lyle Eugene Dunbar (D-82). FTDNATiP predicts a cumulative probability of 60%, 75%, and 85% for TMRCA at 8, 9, and 10 generations, respectively, as shown in **Illustration 5a**, with 9 to 10 generations selected as the range of probabilities of the most likely TMRCA based on the calibration analyses presented in the earlier section. This indicates the most likely TMRCA of about 270 to 300 years before the 1945 birth year of Lyle Eugene Dunbar (D-82), or the 1645 to 1675 time period assuming the nominal 30 years per generation.

This FTDNATiP prediction of 9 to 10 generations and the years 1645 to 1675 for the most likely TMRCA suggests that the common ancestor of the L2 branches of D-13 and Lyle Eugene Dunbar (D-82) could be the 10<sup>th</sup>-generation unknown ancestor of Lyle Eugene Dunbar (D-82), who is called “10<sup>th</sup>-UnKnown (bc.1643)” born in about 1643 and the great-grandfather of John Dunbar of Philadelphia County (b.1733,d.1778). However, this prediction is inconsistent with the Big Y700 test results which assign D-13 to the oldest Age Group 1 and haplogroup R-FT168149 along with D-31 as contrasted with the younger Age Group 4 of the haplogroup R-BY68646 assigned to Lyle Eugene Dunbar (D-82). The ancestry information for D-13 indicates that his EKA was Richard Dunbar (bc.1775) living in 1829 in Lurgacullion Townland, Killeeshil Parish, County Tyrone. The ancestry information for D-31 indicates his 7<sup>th</sup>-generation EKA was Thomas Henry Dunbar (bc.1754,dc.1850) who died in about 1850 at the age of 96 in County Antrim, Ireland, where his son, Thomas Dunbar (b.1784,d.1859), was born in 1784. County Antrim is the next county east of County Tyrone and the ancestors of D-13 probably migrated to County Tyrone from either County Antrim, Ireland, or Scotland in the late-1600’s to early-1700’s before migrating to America in the mid-1800’s. The L2 sub-branch of Lyle Eugene Dunbar (D-82) probably migrated to County Tyrone from either County Antrim or directly from southwest Scotland before migrating to Pennsylvania in 1746. These results suggest that the common ancestor of the L2 sub-branches of D-31 and Lyle Eugene Dunbar (D-82) may have been located in County Antrim, Ireland, in the late-1600’s to early-1700’s or in southwest Scotland prior to the 1600’s. Thus, the common ancestor of D-13 and the author’s L2 branch is probably very distant in Scotland in the mid-1500’s prior to the formation of the Ulster Plantation and first Scottish Protestant immigrants to Ireland in the 1600’s and 1700’s.

**D-296** is a Big Y matching testee with Lyle Eugene Dunbar (D-82) with a GD 4, or 4 mutations or differences in their Y-111 STR markers, and 6 of 615 mutations or differences in their Big Y-700 markers as shown in **Illustration 3 and 5a**. D-296 is assigned to haplogroup R-BY20512 which is part of the oldest Age Group 1 of the haplogroups assigned to the Big Y matching testees. The ancestors of D-296 are based on the information provided by D-296 [Ref. 14]. The EKA of D-296 is listed as his 7<sup>th</sup>-great-grandfather, John Dunbar (bc.1616) born about 1616 in Scotland. Successive ancestors are listed as his son, John D. Dunbar (b.1633) born in 1633 in Scotland; his son, John Dunbar (bc.1662,d.1709), who was born about 1662 in Scotland, married Ann Sullivant, migrated to St. Mary’s Co., MD in 1684, and died in 1709 in St. Mary’s Co., MD; their son, William Dunbar (b.1690,d.1754), who was born in 1690, married second to a wife with first name, Elizabeth, and he died in 1754 in St. Mary’s Co., MD; their son, John Dunbar (bc.1740,d.1797), who was born in 1740, married Frances Abell, and died in 1797 in St. Mary’s Co., MD; their son, Edward Dunbar (b.1790,d.1840), who was born in 1790, married Mary McKay, and died in 1840 in St. Mary’s Co., MD; his son, John Abell Dunbar (b.1824,d.1886), who was born in 1824, married Mary Mariah McKay, and died in 1886 in St. Mary’s Co., MD; their son, James Douglas Dunbar (b.1859,d.1930), who was born in 1859, married

Mary L. Armsworthy, and died in 1930 in St. Mary's Co., MD; their son, the father of D-296; and his son is D-296.

The FTDNATiP calculator was used with a "TMRCA after Gen" of 7 because there is no common ancestor with D-296 before 7 generations in the genealogy information of Lyle Eugene Dunbar (D-82). FTDNATiP predicts a cumulative probability of 41%, 66%, and 81% for TMRCA at 7, 8, and 9 generations, respectively, with 8 to 9 generations selected as the range of probabilities of the most likely TMRCA based on the calibration analyses, as shown in **Illustration 3a**. This indicates the most likely TMRCA of about 240 to 270 years before the 1945 birth year of Lyle Eugene Dunbar (D-82), or the 1675 to 1705 time period assuming the nominal 30 years per generation.

This prediction of 8 to 9 generations and the years 1675 to 1705 for the most likely TMRCA is consistent with the oldest Age Group 1 for the haplogroup R-BY20512 assigned to D-296 as compared with the younger Age Group 4 of the haplogroup R-BY68646 assigned to Lyle Eugene Dunbar (D-82). However, this prediction of 8 to 9 generations is inconsistent with the prediction of 10 to 11 generations for the TMRCA with D-31, who is assigned to the younger haplogroup R-FT168149 in the oldest Age Group 1. However, the FTDNATiP prediction suggests that the branch of D-296 is a younger L2 sub-branch than that of D-31 which contradicts the more accurate Big Y700 test results as discussed later. The L2 sub-branch of D-296 migrated directly from Scotland to Maryland in 1684; the L2 sub-branch of D-31 probably migrated from Scotland to County Antrim, Ireland, before migrating to Canada in the 1800's; the L2 sub-branch of Lyle Eugene Dunbar (D-82) migrated from County Tyrone, Ireland, to Pennsylvania, in 1746. This known ancestry information suggests that the common ancestor of the L2 sub-branch of D-296 and Lyle Eugene Dunbar (D-82) may have been located in Scotland prior to the formation of the Ulster Plantation in Ireland the early-1600's.

**Illustration 10** shows the Dunbar L2 sub-branches family tree for the oldest Age Group 1 including haplogroups R-BY20512 and R-FT168149 based on Big Y Test results, known ancestry information, and the FTDNATiP calculator predictions for D-31, D-296, and D-13. The known ancestry information for each Y-DNA matching testee was used to construct the family tree back in time to the EKA of each L2 sub-branch in haplogroups R-BY20512 and R-FT168149 which originated in Scotland and in County Antrim and County Tyrone in Ireland. Then the earlier ancestors of these L2 sub-branches were inserted in the family tree listing their names as "UnKnown (bc.XXXX)" using their estimated birth year "XXXX" based on an assumed number of years between each unknown generation assuming an average of 30 years per generation. These unknown ancestors were used as placeholders in these L2 sub-branches to define common ancestors and TMRCA's with the other L2 sub-branch haplogroups. The Big Y test results for the oldest haplogroup R-BY20512 assigned to D-296, which is identified by the common shared Terminal SNPs BY20512, BY20514, FT145692, FT144894, and FT258160, shows his EKA as John (bc.1616) and a predicted common ancestor corresponding with the "13<sup>th</sup>-Unknown (bc.1553)" ancestor of the L2-sub-branch of Lyle Eugene Dunbar (D-82). The FTDNATiP calculator using the STR marker test data predicted a much earlier common ancestor somewhere in the 8<sup>th</sup> to 11<sup>th</sup> generations of the L2 sub-branch of Lyle Eugene Dunbar (D-82). However, the Big Y test results are considered more accurate and the common ancestor and TMRCA is predicted to be the "13<sup>th</sup>-Unknown (bc.1553)" born about 1553 in Scotland which predates the formation of the Ulster Plantation and migrations of Ulster Scots from Scotland to Ireland. The common ancestor of the younger sub-branch of haplogroup R-FT168149 is predicted to have been born in Scotland in about 1600 with descendants including ancestors of D-31 who migrated to County

Antrim in Ireland by the mid- 1700's time period and ancestors of D-15 who migrated to County Tyrone, Ireland, by the late-1700's.

## CONCLUSIONS AND RECOMMENDATIONS

The author has used Big Y test results, Y-DNA STR marker test results along with the FTDNATiP calculator, and known ancestry information to predict the origins of common ancestors and the TMRCA of Dunbar L2 branches represented by Dunbar Surname DNA Project testees whose Y-DNA test results show matches to the author's L2 branch listed as Lyle Eugene Dunbar (D-82). The more-detailed and accurate Big Y test results have identified matches with the author that have defined specific haplogroups and the TMRCA for the L2 sub-branches of the author and other Big Y testees. Many L2 branch testees with no Big Y test results are predicted to fit into these haplogroups based on known ancestors related to Big Y testees. The FTDNATiP calculator was calibrated with known ancestry information for several L2 sub-branches resulting in nominal values of 68% probability and 30 years per generation assumed for predictions of the TMRCA. The FTDNATiP calculator predictions generally predicted the relative ages of the various L2 sub-branch haplogroups, but they consistently predicted much earlier values for the TMRCA than suggested by the Big Y test results. The FTDNATiP calculator can be used to show possible connections and TMRCA's, but Big Y test results must be obtained to define specific TMRCA's for the haplogroups.

The Dunbar L2 sub-branch family trees for the five haplogroups, which are defined as Age Group 1 (oldest) to Age Group 5 (youngest) and with matching testees to the Age Group 4 of the L2 sub-branch of Lyle Eugene Dunbar (D-82), were shown previously in **Illustrations 6 to 10**. The L2 sub-branch of Lyle Eugene Dunbar (D-82) was first defined based on his known ancestry beginning with his father, as his 1<sup>st</sup>-generation, and continuing to his EKA who is his 7<sup>th</sup>-generation ancestor, John Dunbar of Philadelphia County (b.1733,d.1778), who was born in County Tyrone, Ireland, in 1733. This L2 sub-branch is associated with the fourth younger (Age Group 4) haplogroup R-BY68646, which was assigned to Lyle Eugene Dunbar (D-82) and D-15, who was the only other matching testee in this L2 branch to complete a Big Y test. Other matching Y-DNA testees with known ancestry but non-Big Y test results were added to the Dunbar L2 sub-branch of Lyle Eugene Dunbar (D-82) including D-7 and D-68. Additional generations of "unknown" ancestors were identified as placeholders to fill gaps in the known ancestry of the various L2 sub-branches based on predictions of the TMRCA and associated number of generations to a common ancestor. In the L2 sub-branch of Lyle Eugene Dunbar (D-82), the author assigned specific "Unknown" ancestors for generations prior to his EKA, his 7<sup>th</sup>-generation ancestor, John Dunbar of Philadelphia County (b.1733,d.1778), assuming an average of 30 years per generation, including: his father as "8<sup>th</sup>-Unknown (bc.1703)"; his grandfather as "9<sup>th</sup>-Unknown (bc.1673)"; his 1<sup>st</sup>-great-grandfather as "10<sup>th</sup>-Unknown (bc.1643)"; and other earlier ancestors through his 4<sup>th</sup>-great-grandfather as "13<sup>th</sup>-Unknown (b.1553)". These specific "Unknown" ancestors were used as placeholders in the Dunbar L2 branch family tree to define common ancestors for the various sub-branch haplogroups.

**Illustration 11** summarizes the Dunbar L2 branch family trees for the five haplogroups with matching testees to the L2 sub-branch and haplogroup R-BY68646 assigned to Lyle Eugene Dunbar (D-82). The author's "13<sup>th</sup>-Unknown (bc.1653)" ancestor is the 4<sup>th</sup>-great-grandfather of John Dunbar of Philadelphia County (b.1733,d.1778), and he is the predicted common ancestor of the oldest (Age Group 1) haplogroup R-BY20512 represented by the L2 sub-branch of D-296 and the next younger haplogroup R-FT168149 of the L2 sub-branch of D-31 and D-13. The TMRCA of this earliest identified ancestor born in about 1653 pre-dates the Ulster Plantation in the Ulster Province of northern

Ireland beginning in the early-1600's, and thus no migration of L2 branches of Scottish Protestants to Ireland were likely to have occurred at that time. The EKA of the L2 sub-branch of D-296 in haplogroup R-BY20512 lived in Scotland in the early 1600's and his descendant, John Dunbar (bc.1662,d.1709), migrated to St. Mary's County in the Maryland Colony of America in 1684. The EKA of D-31 was his 7<sup>th</sup>-generation ancestor, Thomas Henry Dunbar (bc.1754,dc.1850), who died at age 96 in Ireland. His son, Thomas Dunbar (b.1784,d.1859), was born in 1784 in Rasharkin, County Antrim, Ireland, and he migrated to Canada and then to Otoe County, Nebraska, where he died in 1859. Thus, the author concluded that his "13<sup>th</sup>-Unknown (bc.1553)" ancestor was probably born in Scotland in the mid-1500's. One of the L2 sub-branches of this "13<sup>th</sup>-Unknown (bc.1553)" is represented by the ancestor of the L2 sub-branches of D-31 and D-13 who probably migrated from Scotland to County Antrim, Ireland, during the time of the Ulster Plantation by the mid-1700's. The L2 branch of D-31 migrated from County Antrim, Ireland, to Canada and then Nebraska in America by the early-1800's. The L2 branch of D-13 migrated from County Antrim, Ireland, to the adjoining County Tyrone, Ireland, by the mid-1700's. The L2 sub-branch of D-296 descended from the "13<sup>th</sup>-Unknown (bc.1553)" and his descendant migrated directly from Scotland to the Maryland Colony in America in 1684. A third L2 sub-branch descending from the "13<sup>th</sup>-Unknown (bc.1553)" is the "12<sup>th</sup>-Unknown (bc.1583)" who is the common ancestor of all of the other L2 sub-branches beginning with haplogroups R-BY20513, R-BY18214, and R-BY68646, and he probably migrated from Scotland to County Antrim or County Tyrone in Ireland in the late-1600's or early-1700's.

**Illustration 11** shows the author's prediction of his "12<sup>th</sup>-Unknown (bc.1583)" ancestor as the common ancestor of the next three younger haplogroups including: (1) the 2<sup>nd</sup> oldest Age Group 2 for haplogroup R-BY20513 represented by the Big Y test results of D-39, D-327, and D-6; (2) the 3<sup>rd</sup> oldest Age Group 3 for haplogroup R-BY18214 represented by the Big Y test results of D-227, D-303, and D-168; and (3) the 4<sup>th</sup> oldest Age Group 4 for haplogroup R-BY68646 represented by the Big Y test results of Lyle Eugene Dunbar (D-82) and D-15 and the youngest Age Group 5 haplogroups. This "12<sup>th</sup> Unknown (bc.1583)" most likely lived in Scotland and he or one of his descendants probably migrated to the Ulster Province and County Antrim in Ireland during the time of the Ulster Plantation in the late-1600's or early-1700's. His descendants were the ancestors of L2 sub-branches including: (1) D-39 whose EKA lived in County Antrim, Ireland, in the early-1700's; (2) D-327 whose ancestors lived in County Tyrone, Ireland, by the early-1700's; (3) D-6 whose ancestors lived in County Antrim, Ireland, in the early-1700's; and (4) haplogroup R-BY18214 represented by D-227, D-168, and D-303, whose EKA was living in County Tyrone, Ireland, by the late-1700's.

**Illustration 11** shows the author's prediction of his "11<sup>th</sup>-Unknown (bc.1613)" as the common ancestor of his L2 sub-branch in haplogroup R-BY68646 represented by Lyle Eugene Dunbar (D-82) and D-15, and the youngest Age Group 5 haplogroups, and he probably lived and died in Scotland. His son was the "10<sup>th</sup>-Unknown (bc.1643)" ancestor of the L2 sub-branch of Lyle Eugene Dunbar (D-82) and D-15 assigned to haplogroup R-BY68646, and the common ancestor of the L2 sub-branches of the youngest Age Group 5 represented by D-271 and D-340 assigned to haplogroup R-BY121797 and D-318 and D-332 assigned to haplogroup R-FT381714. This "10<sup>th</sup>-Unknown (bc.1643)" ancestor probably was born and died in Scotland. One of his sons was probably the ancestor of the L2 sub-branch of haplogroup R-BY121797 whose descendants probably migrated from Scotland to County Tyrone, Ireland, during the time of the Ulster Plantation by the early-1700's, and then migrated to America by the early-1700's where the EKA, Robert Dunbar Sr (bc.1760,da.1839), was born in about 1760 in Chester, Pennsylvania. Another son of the "10<sup>th</sup>-Unknown (bc.1643)" was probably the common ancestor of the L2 sub-branch of Lyle Eugene Dunbar (D-82) and D-15 whose EKA, John Dunbar of

Philadelphia County (b.1733,d.1778), was born in 1733 in County Tyrone, Ireland, and migrated to Philadelphia, Pennsylvania, in 1746.

The author's prior research has shown that the Dunbar L2 branch probably originated in southwest Scotland in either Ayrshire or Wigtownshire when they adopted the Dunbar surname when surnames were first widely-used in Scotland in the 13<sup>th</sup> century. Members of a Dunbar L1 branch, which is called the Dunbar of Cumnock and Mochrum branch, were large landowners in Ayrshire and Wigtownshire in the 1300-1600 time period, and the author speculates that many of the Dunbar L2 branch members were tenant farmers on the Dunbar of Cumnock and Mochrum branch lands where they adopted the Dunbar surname in the 13<sup>th</sup> century. After King James I of England established the Ulster Plantation in Ireland in the early-1600's, some of these Dunbar L2 branch members migrated from Scotland to County Antrim and County Tyrone in Ireland to seek better economic opportunities and acquire leased farmland. These Scottish settlers in Ireland were then known as "Ulster Scots" in Great Britain. Descendants of many of these Ulster Scots later migrated to America where they were then known as "Scots-Irish" in America.

The results of this study show that the ancestor of D-296, who is assigned to haplogroup R-BY20512 in the oldest Age Group 1, migrated directly from Scotland to the Maryland Colony in America in the late-1600's. Members of this sub-branch should not be considered either "Ulster Scots" or "Scots-Irish". However, all of the other Dunbar L2 sub-branches represented in this study are descended from Ulster Scots who migrated from Scotland to the Ulster Province of Ireland during the time of the Ulster Plantation in the late-1600's to late-1700's time period. Some settled in County Antrim, Ireland, and some settled in County Tyrone, Ireland. Many of the descendants of these Ulster Scots migrated to America in the early-1700's to early-1800's as Scots-Irish immigrants in America. Some descendants of these Ulster Scots migrated from County Tyrone, Ireland, to Australia in the mid-1800's. A few of the Ulster Scot ancestors of the Dunbar L2 sub-branches remained in County Tyrone, Ireland, where some of their descendants live in the Grange Townland of Ardstraw Parish in the present-day.

A key conclusion of the author's research based on the Big Y test results is that the published Genetic Distance, or GD, based on the Y-DNA test results for Y-12, Y-37, and Y-67 marker tests, is a poor indicator of the closeness of relationships of matching testees. The GD does not correlate with the more extensive marker tests of Big Y-500 and Big Y-700 tests. This is apparently because of different mutation rates of many markers. A testee could have the same number of mutations, or GD, but much different predicted TMRCA because of the varying mutation rates. It is clear that Big Y tests are required to define close relationships of matching testees and the TMRCA.

The author has several recommendations for future Big Y tests and focused ancestry research that will provide key information to provide data to confirm some of the predictions in this paper. Additional Big Y tests are recommended for the following Dunbar Lineage 2 group testees in order to resolve key issues as follows:

- The Y-67 test results for D-7 show a GD of 0 or close relationship to the author. George Dunbar (b.1770,d.1859), was the 1<sup>st</sup> son of John Dunbar of Philadelphia County (b.1733,d.1778), who is the EKA of the author. The GD of 0 is probably incorrect based on the Big Y test results presented for others in this paper. A Big Y test would likely confirm the haplogroup of D-7 as R-BY68646 and a match with Lyle Eugene Dunbar (D-82) and D-15, and it would likely define another specific haplogroup for his L2 sub-branch descending from George Dunbar (b.1770,d.1859).

- A Big Y test for D-68 would likely confirm his haplogroup as R-BY68646 and a close-match to Lyle Eugene Dunbar (D-82) and D-15. His EKA is also John Dunbar of Philadelphia County (b.1733,d.1778), but he is a descendant of the 2<sup>nd</sup> son, Robert Dunbar of Pennsylvania and Ohio (b.1771,d.1831), and his son Lewis Dunbar (b.1803,d.1876) of Montgomery County, Indiana, who is a common ancestor with Lyle Eugene Dunbar (D-81) and D-15. A Big Y test would probably define the sub-haplogroup of his L2 sub-branch.

- Many other Dunbar L2 testees listed in **Illustration 5b** should upgrade to the Big Y-700 test to define their specific haplogroup, as opposed to the much older assigned R-M269 and R-M222 haplogroups. The Big Y-700 test results along with known ancestry information for matching Big Y testees would define the relationships of their L2 sub-branch with other L2 sub-branches.

The author also has several recommendations for future focused ancestry research that will provide key information to define actual TMRCA and identify common ancestors for the Dunbar L2 branches as follows:

- Common ancestors of haplogroups R-BY121797 and R-BY68646 in County Tyrone, Ireland- Search for the author’s ancestors in County Tyrone, Ireland, including the “8<sup>th</sup>- Unknown (bc.1703)” who was the father of John Dunbar of Philadelphia County (b.1733,d.1778), who was born in 1733 in County Tyrone, Ireland, and came to Philadelphia in 1746. This could lead to identifying the “10<sup>th</sup>- Unknown (bc.1643)”, who was probably the ancestor of Robert Dunbar Sr (bc.1760, da.1739) and the EKA of the youngest Age Group 5 haplogroup R-BY121967.

- Common Ancestors of haplogroups R-BY20513 and R-BY68646 in County Antrim, Ireland- Search for the author’s “12<sup>th</sup> Unknown (bc.1583)” common ancestor and his descendants in County Antrim and County Tyrone in Ireland, who were the ancestors of the L2 sub-branches of D-39, D-6, and D-327 assigned to haplogroup R-BY20513.

- Common Ancestors of haplogroups R-BY18214 and R-BY68646 in County Tyrone, Ireland- Search for the ancestors in County Tyrone, Ireland, of the L2 sub-branches of D-227, D-168, and D-303 assigned to haplogroup R-BY18214. A search for the ancestors of Daniel Charles Dunbar (b.1765) prior to the late-1700’s in County Tyrone could identify the connections of the various L2 sub-branches with origins in County Tyrone.

- Common Ancestors of haplogroup R-BY20512 and the other haplogroups- Identify the author’s “13<sup>th</sup> Unknown (bc.1553)” ancestor in Scotland who was the ancestor of the L2 sub-branch of D-296 who migrated to Maryland in 1684; the ancestor of the L2 sub-branch of D-31, who migrated to County Antrim, Ireland, by the 1700’s; and the ancestor of the L2 sub-branch of D-13, who migrated from County Tyrone, Ireland, by the late-1700’s.

- Origins of L2 Branch Dunbar Surname- Identify the connections of the Dunbar L2 branch with the Dunbar L1 branches in Scotland which resulted in the L2 branch acquiring the Dunbar surname.

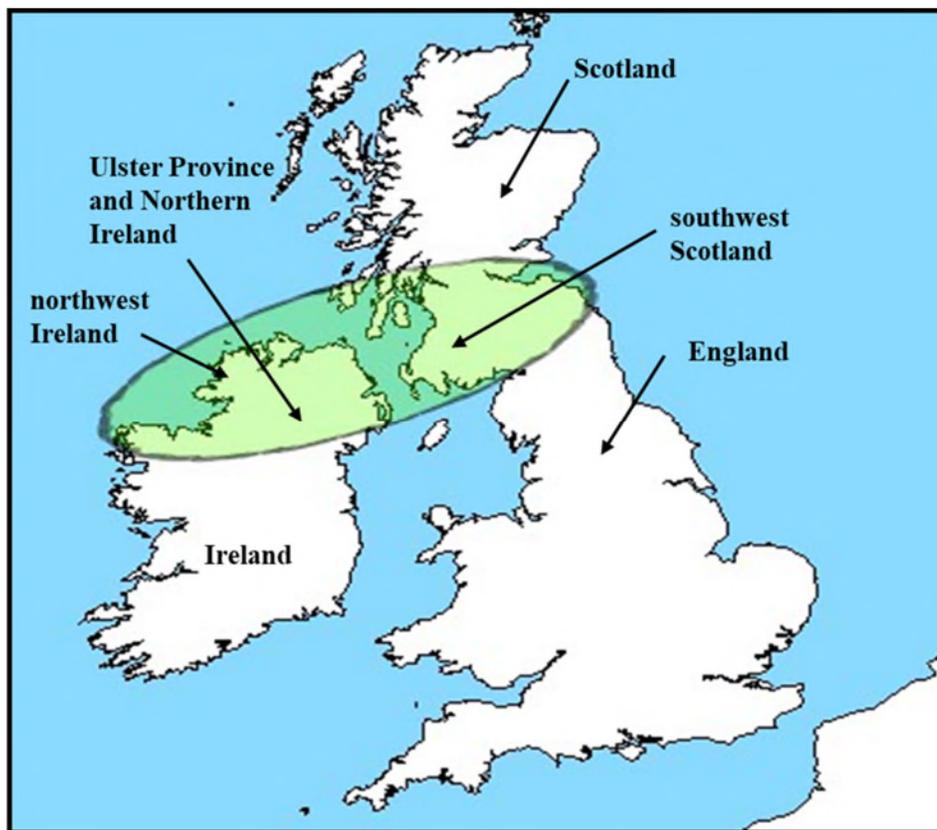
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- R1b1a2; R-M269
  - R1b1a2a1a1; R-L11/S127
    - R1b1a2a1a1a3; 439=null - R-L1, 439=null
      - R1b1a2a1a1a4; R-L48/S162
      - R1b1a2a1a1b; R-P312
        - R1b1a2a1a1b3c; R-L2/S1139
        - R1b1a2a1a1b4; R-L21
          - R1b1a2a1a1b4b; R-M222
        - R1b1a2a1a1b5; R-L176.2
          - R1b1a2a1a1b5a; R-M167/SRY2627
  - R1b1b2a1a; R-U106
    - R1b1b2a1a1; R-U106
    - R1b1b2a1a2c; R-M167
    - R1b1b2a1a2f1; R-M37

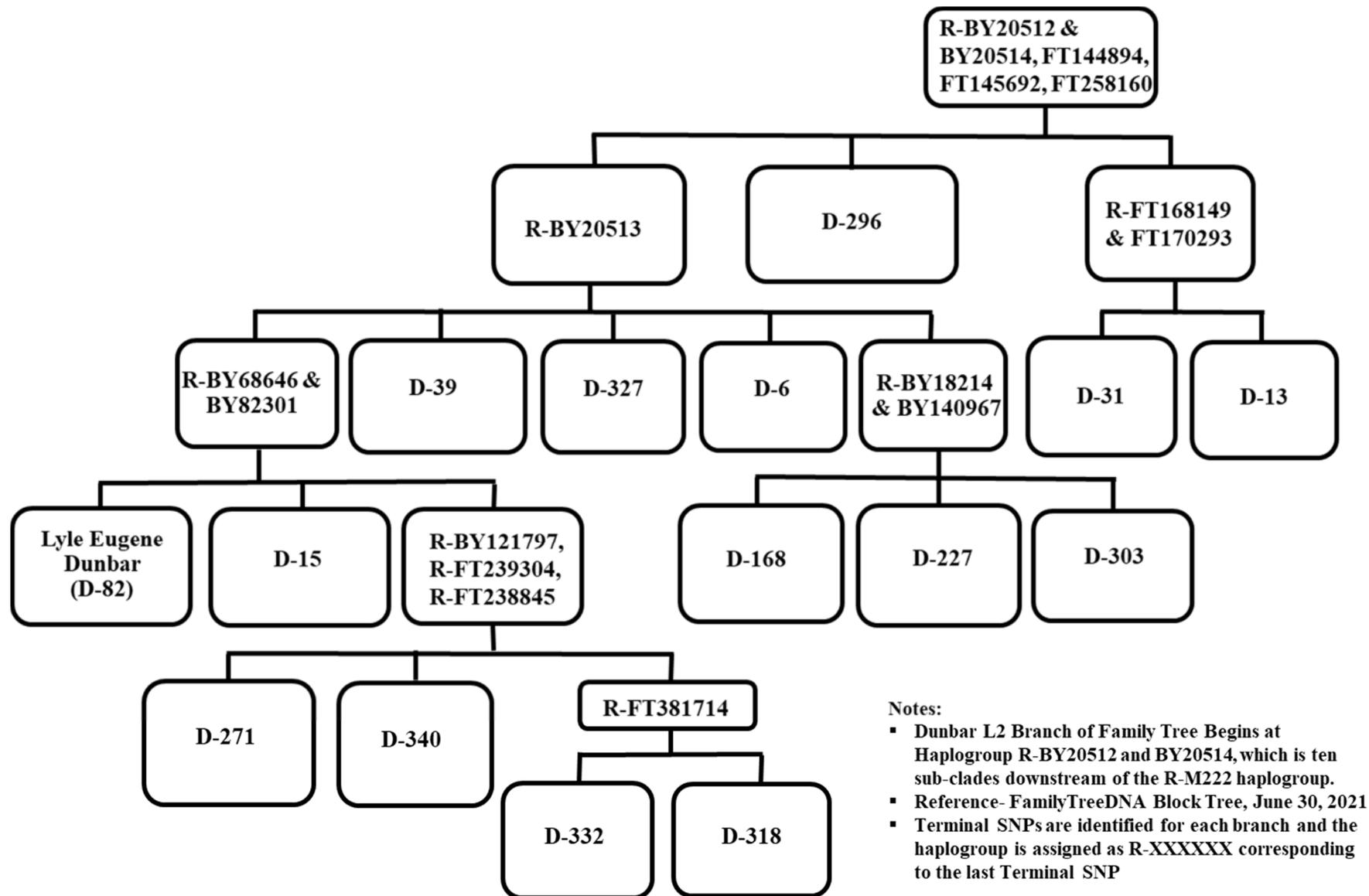
**Illustration 1.** This chart shows part of the R1b sub-haplogroup Y-chromosome phylogenetic tree of the western European R-M269 (R1b1a2) sub-haplogroup based on Y-DNA test results which includes Dunbar Lineage 1 branch males defined by the older R-U106 (R1b1b2a1a) sub-haplogroup and Dunbar Lineage 2 branch males defined by the younger R-M222 (R1b1a2a1a1b4b) sub-haplogroup.



**Illustration 2.** This map of the British Isles shows the shaded areas of northwest Ireland, Ulster Province and Northern Ireland, and the Lowlands of southwest Scotland where Y-DNA tests show a high frequency of the M222 haplotype in the present-day male population, which indicates its most likely origins as well as the later presence of Dunbar Lineage 2 branch ancestors.

Testee Name and/or Project ID No	Big Y Test	GD	No. STR Differences	Terminal SNPs	No. Private Variant/SNPs	Assigned Haplogroup
D-318	Y-700	4	5 of 610	BY121797, FT239304, FT238845, FT381714	1	R-FT381714
D-332	Y-700	6	8 of 602	BY121797, FT239304, FT238845, FT381714	3	R-FT381714
D-271	Y-500	3	7 of 518	BY121797, FT239304, FT238845, FT381714	1	R-BY121797
D-340	Y-700	2	8 of 601	BY121797, FT239304, FT238845, FT381714	1	R-BY121797
Lyle Eugene Dunbar (D-82)	Y-700	-	-	BY68646, BY82301	4	R-BY68646
D-15	Y-700	4	5 of 598	BY68646, BY82301	2	R-BY68646
D-303	Y-700	3	10 of 607	BY18214, BY140967	2	R-BY18214
D-227	Y-700	8	7 of 579	BY18214, BY140957	0	R-BY18214
D-268	Y-500	4	3 of 500	BY18214, BY140957	1	R-BY18214
D-6	Y-700	4	6 of 606	BY20513	2	R-BY20513
D-327	Y-700	2	4 of 569	BY20513	4	R-BY20513
D-39	Y-700	5	4 of 624	BY20513	3	R-BY20513
D-31	Y-700	8	8 of 614	BY20512, BY20514, FT145692, FT144894, FT258160	6	R-FT168149
D-13	Y-700	4	7 of 586	BY20512, BY20514, FT145692, FT144894, FT258160	4	R-FT168149
D-296	Y-700	4	6 of 615	BY20512, BY20514, FT145692, FT144894, FT258160	4	R-BY20512

**Illustration 3. Big Y test results for Dunbar L2 branch matches listed by Project ID No. with the author listed as Lyle Eugene Dunbar (D-82) and arranged in order of the youngest haplogroup (top group of 4) to the oldest haplogroup (bottom group of 3).**



**Illustration 4. Dunbar Lineage 2 branch family tree based on Big Y test results for the 14 Big Y matching testees, who are identified by their Project ID No. “D-XXX”, and the author, who is listed as Lyle Eugene Dunbar (D-82), with “R-XXXXXX” haplogroups arranged from the oldest at the top and to youngest at the bottom of the tree.**

Testee Name and Project ID No.	STR Test	GD	Probability % for TMRCA in Generations (Gen) for D-82									Assigned Haplogroup
			Gen4	Gen5	Gen6	Gen7	Gen8	Gen9	Gen10	Gen11	Gen12	
D-296	Y-111	4				41	66	81	89	94	97	R-BY20512
D-31	Y-111	8				21	40	56	69	78	85	R-FT168149
D-13	Y-111	4				36	60	75	85	91	94	R-FT168149
D-327	Y-111	2				53	78	90	95	98	99	R-BY20513
D-39	Y-111	5				41	66	81	89	94	97	R-BY20513
D-6	Y-111	4				29	51	67	78	85	90	R-BY20513
D-303	Y-111	3				41	66	81	89	94	97	R-BY18214
D-227	Y-111	8				13	27	41	54	65	74	R-BY18214
D-268	Y-37	4				14	27	39	50	60	68	R-BY18214
Lyle Eugene Dunbar (D-82)	Y-111	-	TMRCA % in Generations after D-82 birth year of 1945									R-BY68646
D-15	Y-111	4	23	45	62	75	84	90	94	97	98	R-BY68646
D-271	Y-111	3				41	66	81	85	94	97	R-BY121797
D-340	Y-111	2				47	73	86	93	96	98	R-BY121797
D-318	Y-111	4				34	58	74	84	91	95	R-FT381714
D-332	Y-111	6				27	49	66	78	86	91	R-FT381714

**Illustration 5a. Y-DNA STR Test Results and TMRCA predictions using the FTDNATiP calculator for the 14 Dunbar Lineage 2 branch matches with the author, who is listed as Lyle Eugene Dunbar (D-82), with the testees arranged in groups from the oldest (top) to the youngest (bottom) haplogroups.**

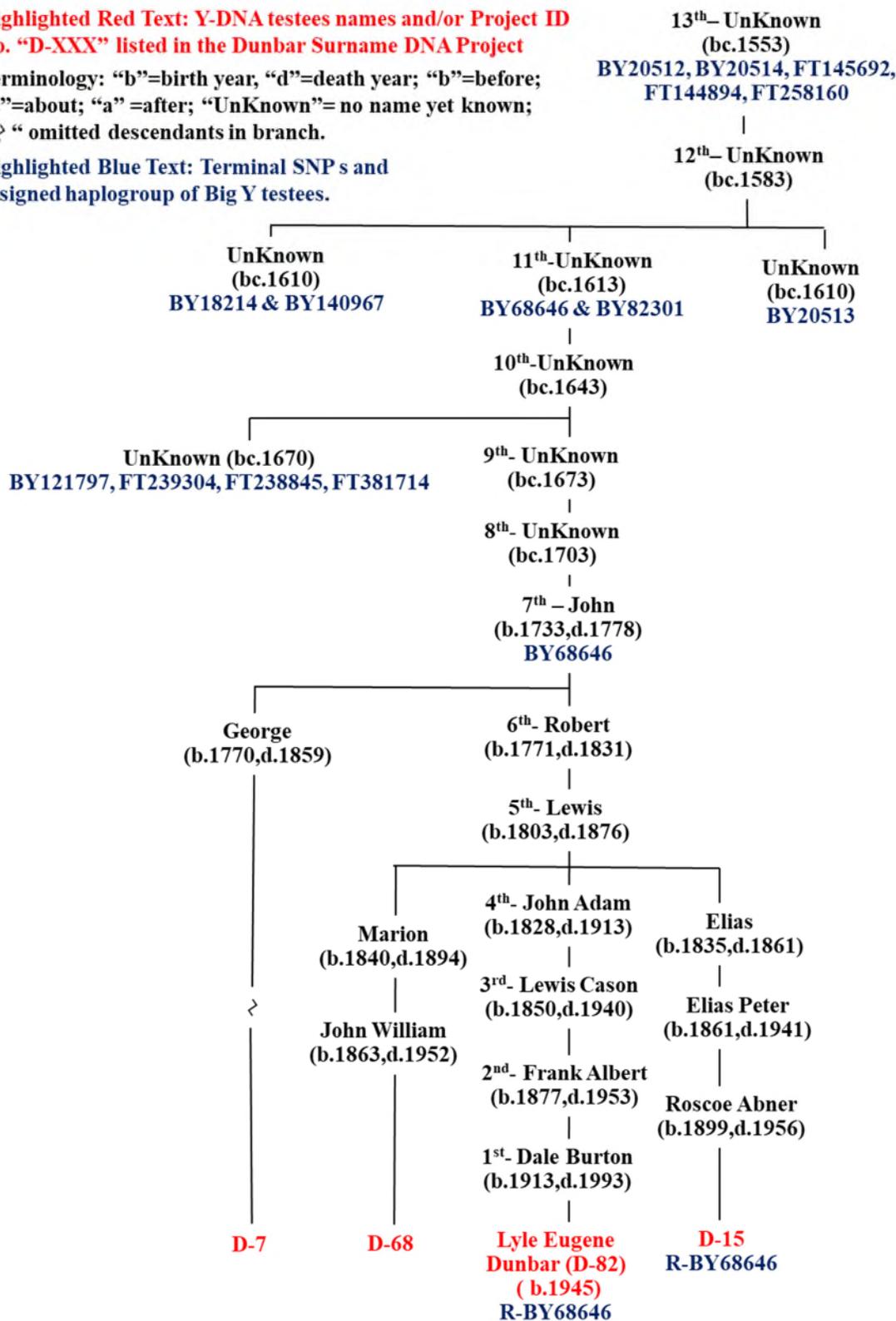
Testee Name and Project ID No.	STR Test	GD	Probability % for TMRCA in Generations (Gen) for D-82									Assigned Haplogroup
			Gen4	Gen5	Gen6	Gen7	Gen8	Gen9	Gen10	Gen11	Gen12	
Lyle Eugene Dunbar (D-82)	Y-111	-	TMRCA % in Generations after D-82 birth year of 1945									R-BY68646
D-68	Y-67	2	43	68	82	90	94	97	98	99	99	M-269
D-7	Y-67	0			43	68	82	90	94	97	98	M-269
D-260	Y-111	3				43	68	82	90	94	97	R-M269
D-274	Y-67	2				44	68	82	90	94	97	R-M269
D-185	Y-67	3				48	64	75	83	89	93	R-M269
D-289	Y-67	3				49	65	76	84	89	93	R-BY199
D-273	Y-111	6				27	49	66	78	86	91	R-BY199
D-288	Y-67	3				29	51	66	77	85	90	R-M269
D-108	Y-67	3				29	51	67	73	85	90	R-M269
D-11	Y-67	3				29	52	67	78	85	91	R-M269
D-115	Y-37	2				29	50	65	76	85	88	R-M269
D-289	Y-37	3				21	39	54	65	74	81	R-M269
D-111	Y-12	0	No prediction for Y-12 marker test									R-M269
D-77	Y-12	0	No prediction for Y-12 marker test									R-M269
D-322	Y-12	0	No prediction for Y-12 marker test									R-M269

**Illustration 5b. Y-DNA STR Test Results and TMRCA predictions using the FTDNATiP calculator for Dunbar Lineage 2 branch matching testees with the author, who is listed as Lyle Eugene Dunbar (D-82), with non-Big Y matching testees identified by their Project ID No. “D-XXX”**

**Highlighted Red Text: Y-DNA testees names and/or Project ID No. "D-XXX" listed in the Dunbar Surname DNA Project**

Terminology: "b"=birth year, "d"=death year; "b"=before; "c"=about; "a" =after; "UnKnown"= no name yet known; " > " omitted descendants in branch.

**Highlighted Blue Text: Terminal SNP s and assigned haplogroup of Big Y testees.**

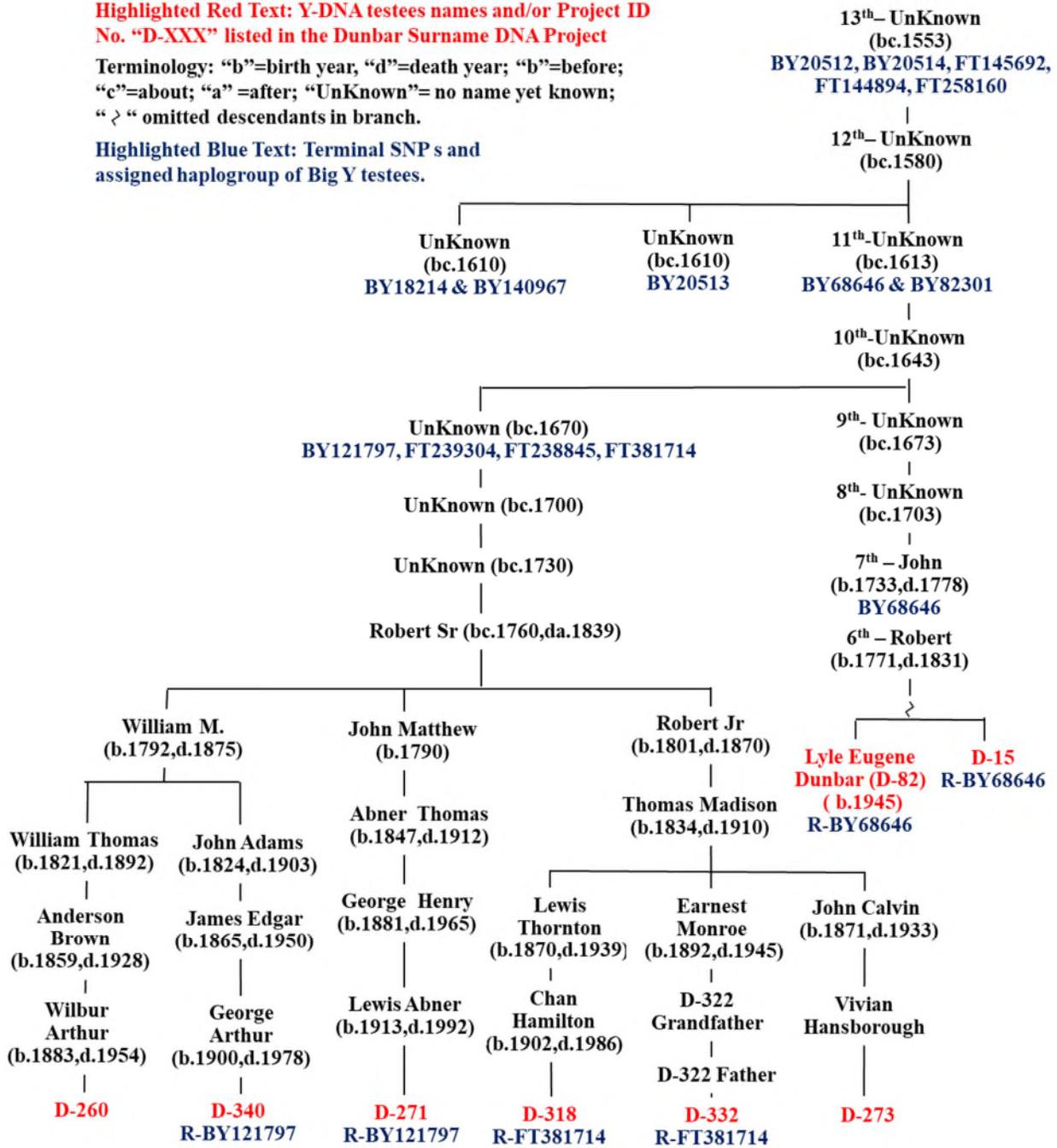


**Illustration 6. Dunbar L2 sub-branches of Age Group 4 for haplogroup R-BY68646 and predicted connections to other L2 sub-branches and haplogroups.**

**Highlighted Red Text: Y-DNA testees names and/or Project ID  
No. "D-XXX" listed in the Dunbar Surname DNA Project**

Terminology: "b"=birth year, "d"=death year; "b"=before;  
"c"=about; "a" =after; "UnKnown"= no name yet known;  
" > " omitted descendants in branch.

**Highlighted Blue Text: Terminal SNP s and  
assigned haplogroup of Big Y testees.**

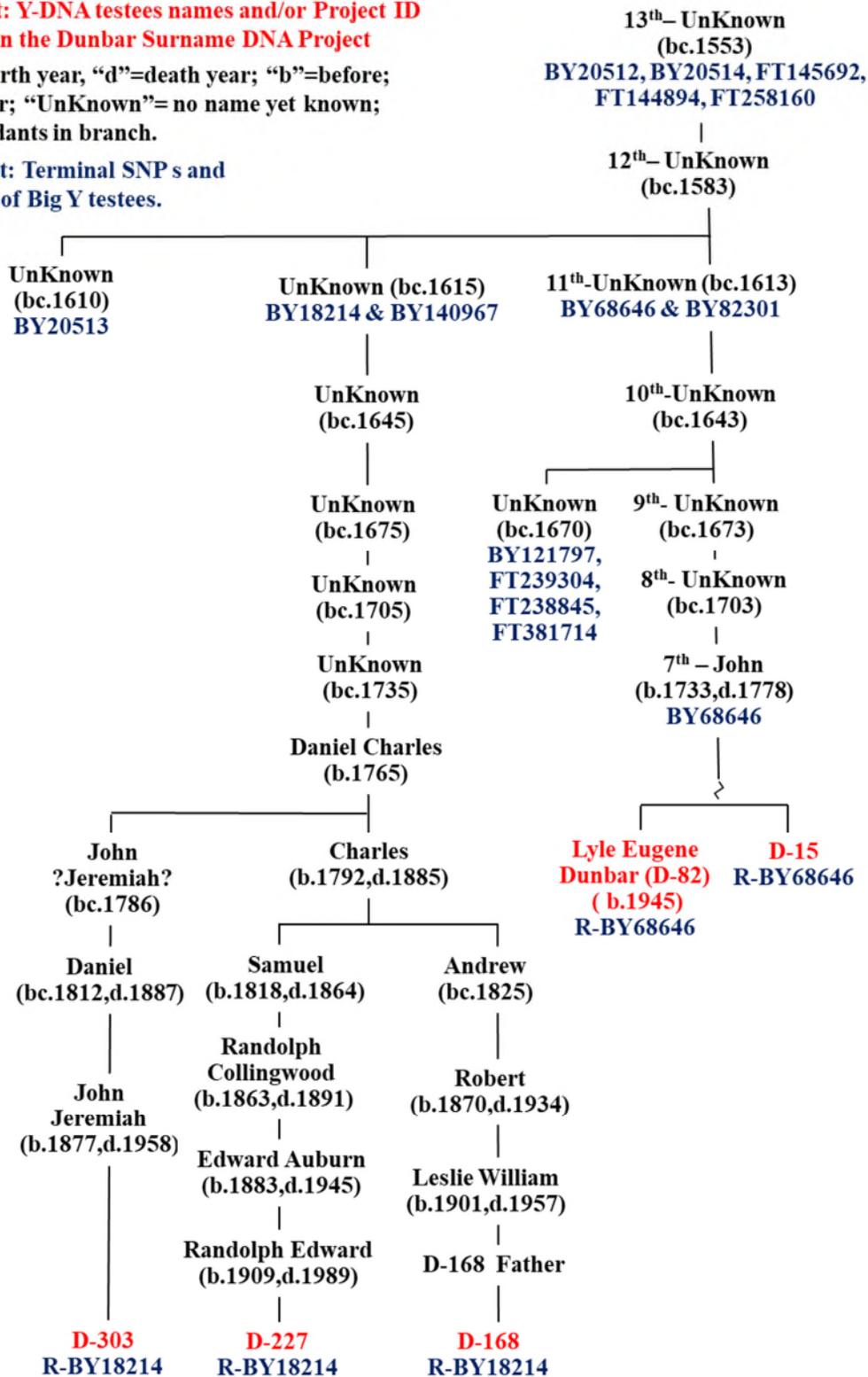


**Illustration 7. Dunbar L2 sub-branches of Age Group 5 for haplogroups R-BY121797 and R-FT381714, and predicted connections to other L2 sub-branches and haplogroups.**

**Highlighted Red Text: Y-DNA testees names and/or Project ID No. "D-XXX" listed in the Dunbar Surname DNA Project**

Terminology: "b"=birth year, "d"=death year; "b"=before; "c"=about; "a" =after; "UnKnown"= no name yet known; " > " omitted descendants in branch.

**Highlighted Blue Text: Terminal SNP s and assigned haplogroup of Big Y testees.**

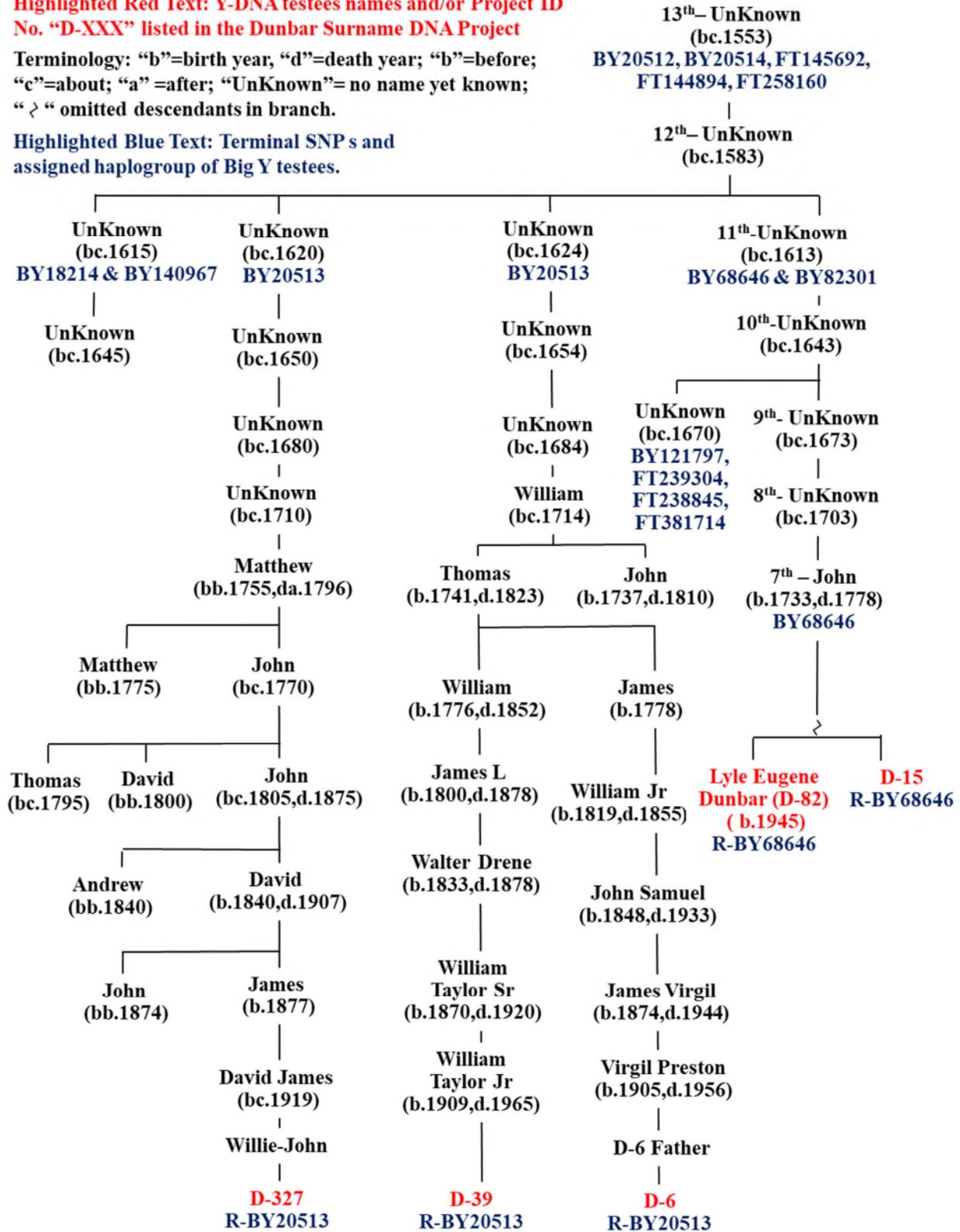


**Illustration 8. Dunbar L2 sub-branches of haplogroup R-BY18214 and predicted connections to other L2 sub-branches and haplogroups.**

**Highlighted Red Text: Y-DNA testees names and/or Project ID No. "D-XXX" listed in the Dunbar Surname DNA Project**

Terminology: "b"=birth year, "d"=death year; "b"=before; "c"=about; "a" =after; "UnKnown"= no name yet known; " > " omitted descendants in branch.

**Highlighted Blue Text: Terminal SNP s and assigned haplogroup of Big Y testees.**

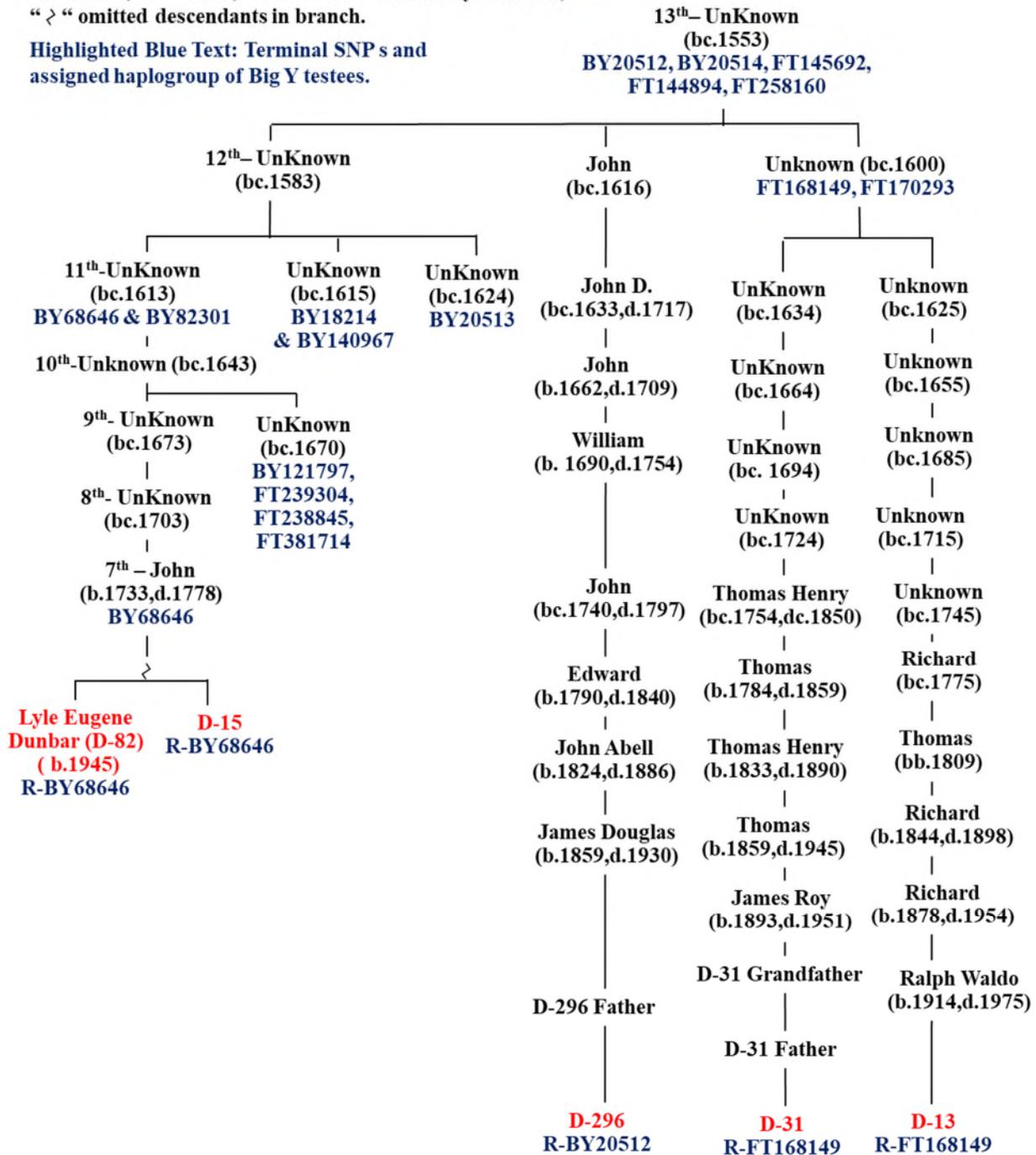


**Illustration 9. Dunbar L2 sub-branches of haplogroup R-BY20513 and predicted connections to other L2 sub-branches and haplogroups.**

**Highlighted Red Text: Y-DNA testees names and/or Project ID  
No. "D-XXX" listed in the Dunbar Surname DNA Project**

Terminology: "b"=birth year, "d"=death year; "b"=before;  
"c"=about; "a" =after; "UnKnown"= no name yet known;  
" > " omitted descendants in branch.

**Highlighted Blue Text: Terminal SNP s and  
assigned haplogroup of Big Y testees.**



**Illustration 10. Dunbar L2 sub-branches of haplogroup R-BY20512 and predicted connections to other L2 sub-branches and haplogroups.**

**Highlighted Red Text: Y-DNA testees names and/or Project ID  
No. “D-XXX” listed in the Dunbar Surname DNA Project**

Terminology: “b”=birth year, “d”=death year; “b”=before; “c”=about; “a” =after; “UnKnown”= no name yet known; “ > ” omitted descendants in branch.

**Highlighted Blue Text: Terminal SNP s and assigned haplogroup of Big Y testees.**

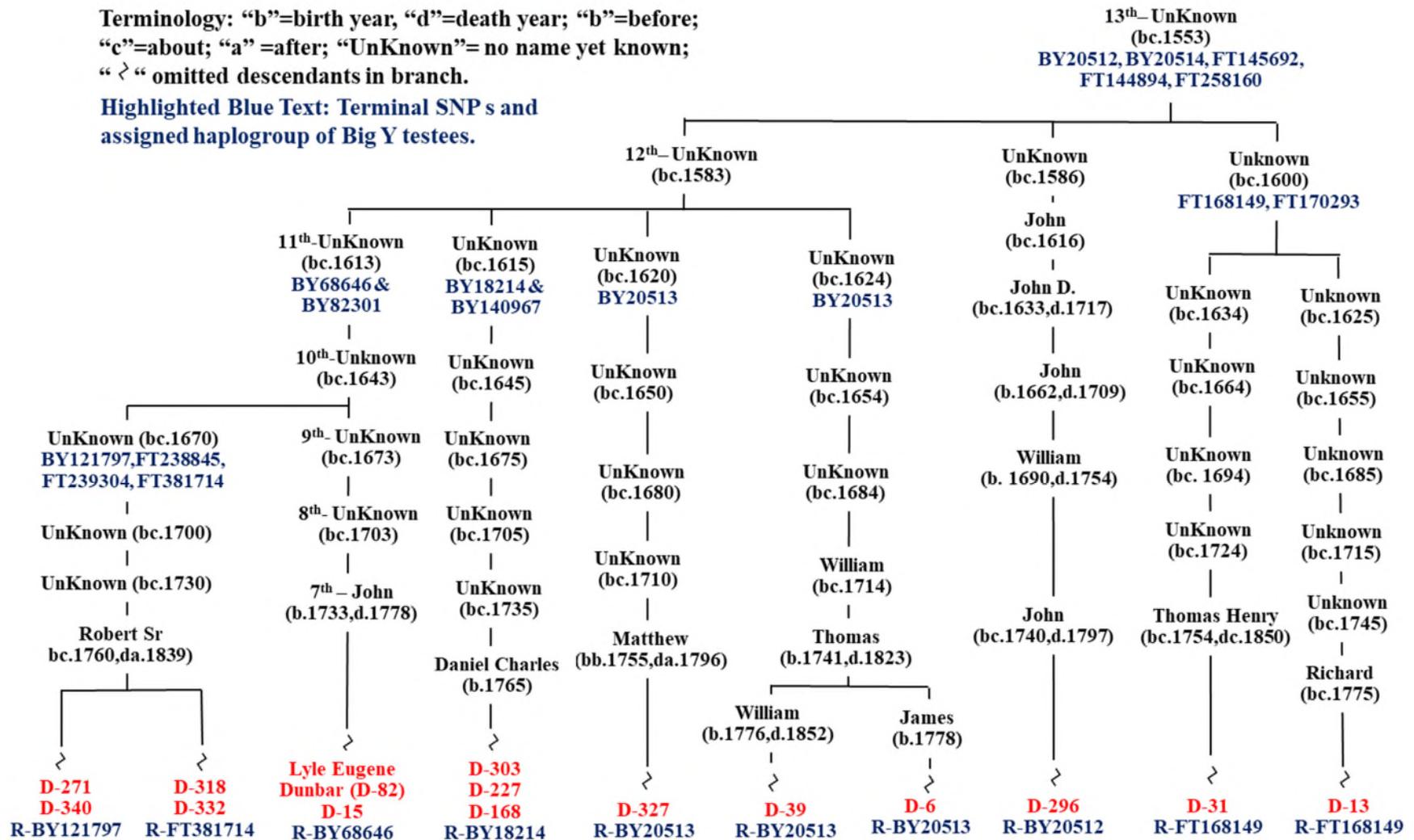


Illustration 11. Dunbar L2 branch family tree with predicted connections of L2 sub-branches of haplogroups R-BY20512, R-FT168149, R-BY20513, R-BY18214, R-BY68646, R-BY121797, and R-FT381714.